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United States  
Department of  
Agriculture

Natural  
Resources  
Conservation  
Service

# Washington Basin Outlook Report

## May 1, 1999



# **Basin Outlook Reports**

**and**

## **Federal - State - Private**

## **Cooperative Snow Surveys**

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### **How forecasts are made**

Most of the annual streamflow in the western United States originates as snowfall that has accumulated in the mountains during the winter and early spring. As the snowpack accumulates, hydrologists estimate the runoff that will occur when it melts. Measurements of snow water equivalent at selected manual snow courses and automated SNOTEL sites, along with precipitation, antecedent streamflow, and indices of the El Niño / Southern Oscillation are used in computerized statistical and simulation models to prepare runoff forecasts. These forecasts are coordinated between hydrologists in the Natural Resources Conservation Service and the National Weather Service. Unless otherwise specified, all forecasts are for flows that would occur naturally without any upstream influences.

Forecasts of any kind, of course, are not perfect. Streamflow forecast uncertainty arises from three primary sources: (1) uncertain knowledge of future weather conditions, (2) uncertainty in the forecasting procedure, and (3) errors in the data. The forecast, therefore, must be interpreted not as a single value but rather as a range of values with specific probabilities of occurrence. The middle of the range is expressed by the 50% exceedance probability forecast, for which there is a 50% chance that the actual flow will be above, and a 50% chance that the actual flow will be below, this value. To describe the expected range around this 50% value, four other forecasts are provided, two smaller values (90% and 70% exceedance probability) and two larger values (30%, and 10% exceedance probability). For example, there is a 90% chance that the actual flow will be more than the 90% exceedance probability forecast. The others can be interpreted similarly.

The wider the spread among these values, the more uncertain the forecast. As the season progresses, forecasts become more accurate, primarily because a greater portion of the future weather conditions become known; this is reflected by a narrowing of the range around the 50% exceedance probability forecast. Users should take this uncertainty into consideration when making operational decisions by selecting forecasts corresponding to the level of risk they are willing to assume about the amount of water to be expected. If users anticipate receiving a lesser supply of water, or if they wish to increase their chances of having an adequate supply of water for their operations, they may want to base their decisions on the 90% or 70% exceedance probability forecasts, or something in between. On the other hand, if users are concerned about receiving too much water (for example, threat of flooding), they may want to base their decisions on the 30% or 10% exceedance probability forecasts, or something in between. Regardless of the forecast value users choose for operations, they should be prepared to deal with either more or less water. (Users should remember that even if the 90% exceedance probability forecast is used, there is still a 10% chance of receiving less than this amount.) By using the exceedance probability information, users can easily determine the chances of receiving more or less water.

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# Washington Water Supply Outlook

May 1999

## General Outlook

Below average temperatures during April helped sustain the mountain snowpack at much above average levels. Precipitation was much below average for most areas in Washington. Mountain precipitation came as snow, which also helped to delay the normal snowmelt. Some sites are beginning to show normal melt patterns. However with record levels of snow still in the mountains, many sites are predicted to maintain snow well into early summer. Spring and summer flooding is possible for many Eastern Washington counties, including Yakima, Okanogan, Chelan, Pend Oreille, Spokane, Klickitat, Kittitas, Walla Walla and Columbia Counties.

## Snowpack

The May 1 statewide SNOTEL readings were much above normal at 210% of average. The Pend Oreille River Basin snow surveys reported the lowest readings at 112% of average. The Entiat River Basin reported the highest snowpack readings at 1206% of average. Westside averages from SNOTEL data, combined with May 1 snow survey data, showed the North Puget Sound river basins with 171% of average, the Central Puget Sound river basins with 166%, and the Cowlitz - Lewis river basins with 253% of average. Snowpack along the east slopes of the Cascade Mountains included the Yakima area with 210% and the Wenatchee area with 373%. Snowpack in the Spokane River Basin was at 128% and in the Lower Snake River Basin it was 136% of average. Maximum snow cover in Washington was at Paradise Park SNOTEL near Mount Rainier. The water content was 107.9 inches on May 1. This site would normally have 61.8 inches of water content on that date. Last year at this time, Paradise Park had 70 inches of snow water equivalent. The highest average in the state was Spirit Lake SNOTEL near Mount St. Helens with 1700% of average.

BASIN	PERCENT OF LAST YEAR	PERCENT OF AVERAGE
Spokane .....	253 .....	128
Newman Lake .....	257 .....	134
Pend Oreille .....	169 .....	112
Okanogan .....	174 .....	143
Methow .....	173 .....	165
Similkameen .....	229 .....	131
Wenatchee .....	257 .....	198
Chelan .....	179 .....	163
Steptoe Creek .....	203 .....	292
Yakima .....	197 .....	200
Ahtanum Creek .....	176 .....	252
Walla Walla .....	251 .....	165
Lower Snake .....	154 .....	136
Cowlitz .....	184 .....	191
Lewis .....	245 .....	315
White .....	139 .....	195
Green .....	246 .....	175
Puyallup .....	139 .....	195
Cedar .....	350 .....	167
Snoqualmie .....	232 .....	169
Skykomish .....	247 .....	160
Skagit .....	230 .....	180
Baker .....	157 .....	151
Nooksack .....	324 .....	181
Olympic Peninsula .....	218 .....	225

## Precipitation

For the month of April, the National Weather Service and Natural Resources Conservation Service climate stations showed precipitation accumulation to be much below average across Washington. However, basin averages for the water-year varied from 154% of average in the Olympic Peninsula river basins to 110% of average in the Walla Walla river basins. The highest individual site average for the water-year was 223% of average at Thunder Basin SNOTEL site in the North Cascade Mountains. Many SNOTEL precipitation gauges were plagued by snow plugs throughout the winter, making it difficult to track monthly accumulations. Snow plugs are caused by large amounts of heavy wet snow falling into the gauge and freezing before it can melt. These plugs generally break loose prior to spring melt and do not effect the total accumulation for the water-year.

RIVER BASIN	APRIL PERCENT OF AVERAGE	WATER YEAR PERCENT OF AVERAGE
Spokane .....	50 .....	118
Colville-Pend Oreille .....	65 .....	124
Okanogan-Methow .....	45 .....	136
Wenatchee-Chelan .....	36 .....	139
Upper Yakima .....	44 .....	129
Lower Yakima .....	35 .....	133
Walla Walla .....	60 .....	110
Lower Snake .....	51 .....	111
Cowlitz-Lewis .....	51 .....	137
White-Green-Puyallup .....	52 .....	124
Central Puget Sound .....	50 .....	132
North Puget Sound .....	51 .....	134
Olympic Peninsula .....	58 .....	125

## Reservoir

Reservoir storage in the Yakima Basin was 519,800-acre feet, or 83% of average for the upper reaches and 140,100-acre feet, or 88% of average for Rimrock and Bumping Lakes. Storage at the Okanogan reservoirs was 128% of average for May 1. The power generation reservoirs included the following: Coeur d'Alene Lake, 284,500-acre feet, or 115% of average and 119% of capacity; Chelan Lake, 172,600-acre feet, 38% of average and 26% of capacity; and Ross Lake at 62% of average and 28% of capacity. Most reservoir operators have lowered water levels in anticipation of considerable runoff this spring.

BASIN	PERCENT OF CAPACITY	PERCENT OF AVERAGE
Spokane .....	119 .....	115
Colville-Pend Oreille .....	92 .....	366
Okanogan-Methow .....	87 .....	128
Wenatchee-Chelan .....	26 .....	38
Upper Yakima .....	62 .....	83
Lower Yakima .....	60 .....	88
Five Yakima Reservoirs .....	57 .....	81
North Puget Sound .....	28 .....	62

## Streamflow

May 1 forecasts indicate above normal summer flows for all streams in the state. They vary from 202% of average for the Colville River at Kettle Falls to 112% of average for the Columbia River at Birchbank. May forecasts for some Western Washington streams include: Cedar River near Cedar Falls, 134%; Lewis River, 153%; and the Skagit River, 132%. Some Eastern Washington streams include the Yakima River near Parker, 147%; the Wenatchee River at Plain, 145%; and the Spokane River near Post Falls, 134%. Volumetric forecasts are developed using current, historic, and average snowpack, precipitation and streamflow data collected and coordinated by organizations cooperating with NRCS. Forecasts are an indication of average sustained streamflow and are not indicative of peak and low flow conditions.

Streamflows reported for April varied from well above to below average. The South Fork Walla Walla River near Milton Freewater had the highest flows with 203% of average. The Bumping River near Nile, with 49% of average, had the lowest in the state. Other streamflows were the following percentage of average: the Priest River, 120%; the Columbia at the International Boundary, 113%; the Spokane at Spokane, 93%; the Columbia below Rock Island Dam, 112%; the Cle Elum River near Roslyn, 80%; and the Snake River below Ice Harbor Dam, 116%. Average monthly streamflows are not an indicator of peak and low flow conditions.

BASIN	PERCENT OF AVERAGE MOST PROBABLE FORECAST (50 PERCENT CHANCE OF EXCEEDENCE)
Spokane .....	130-134
Colville-Pend Oreille .....	112-202
Okanogan-Methow .....	127-155
Wenatchee-Chelan .....	118-156
Upper Yakima .....	139-148
Lower Yakima .....	130-179
Walla Walla .....	127-170
Lower Snake .....	119-127
Cowlitz-Lewis .....	117-179
White-Green-Puyallup .....	114-116
Central Puget Sound .....	128-135
North Puget Sound .....	120-145
Olympic Peninsula .....	152-161
STREAM	PERCENT OF AVERAGE APRIL STREAMFLOWS
Pend Oreille Below Box Canyon .....	95
Kettle at Laurier .....	157
Columbia at Birchbank .....	113
Spokane at Long Lake .....	103
Similkameen at Nighthawk .....	140
Okanogan at Tonasket .....	170
Methow at Pateros .....	144
Chelan at Chelan .....	99
Wenatchee at Pashastin .....	96
Yakima at Cle Elum .....	88
Yakima at Parker .....	99
Naches at Naches .....	111
Grande Ronde at Troy .....	119
Snake below Lower Granite Dam .....	116
SF Walla Walla near Milton Freewater .....	203
Cowlitz below Mayfield Dam .....	76
Skagit at Concrete .....	155

*For more information contact your local Natural Resources Conservation Service office.*

BASIN SUMMARY OF  
SNOW COURSE DATA

MAY 1999

SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-90	SNOW COURSE	ELEVATION	DATE	SNOW DEPTH	WATER CONTENT	LAST YEAR	AVERAGE 1961-90
ALPINE MEADOWS PILL	3500	5/01/99	---	34.0E	47.2	--	LUBRECHT FOREST NO 6	4040	4/29/99	0	.0	.0	.1
AMERROSE	6480	5/02/99	32	14.0	9.4	12.1	LUBRECHT HYDROPILOT	4200	4/29/99	0	.0	.0	.1
ASHLEY DIVIDE	4820	4/27/99	1	.3	.0	1.0	LUBRECHT PILLOW	4680	5/01/99	---	.0	.0	1.7
BADGER PASS PILLOW	6900	5/01/99	---	47.0	20.6	37.8	MARIAS PASS	5250	4/27/99	38	17.9	3.2	14.4
BAREE CREEK	5500	4/29/99	121	58.8	31.2	43.0	MCCULLOCH CAN.	3900	4/28/99	0	.0	.0	2.0
BAREE MIDWAY	4600	4/29/99	100	46.4	20.8	29.4	MEADOWS CABIN	1900	4/30/99	0	.0	.0	1.1
BAREE TRAIL	3800	4/29/99	0	.0	.0	1.3	MEADOWS PASS PILLOW	3240	5/01/99	---	28.5	4.9	21.0
BARKER LAKES PILLOW	8250	5/01/99	---	18.3	12.7	16.0	MERRITT	2140	4/29/99	28	12.8	.0	3.6
BASIN CREEK PILLOW	7180	5/01/99	---	9.4	12.2	10.0	MICA CREEK PILLOW	4750	5/01/99	---	26.1	6.5	--
BASSOO PEAK	5150	4/27/99	10	3.6	.0	5.7	MINERAL CREEK	4000	4/28/99	29	11.9	3.0	11.2
BEAVER CREEK TRAIL	2200	4/29/99	46	20.4	.0	4.1	MONASHEE PASS CAN.	4200	4/28/99	33	14.0	9.1	12.0
BEAVER PASS	3680	4/29/99	124	63.0	22.4	28.1	MORSE CREEK PILLOW	6200	5/01/99	---	17.7	10.5	14.6
BERNE-MILL CREEK (d)	3170	4/29/99	97	43.5	20.1	20.8	MORSE LAKE PILLOW	5400	5/01/99	---	90.4	68.3	44.4
HIG CREEK	6750	4/30/99	94	41.2	36.8	49.8	MOSES MTN PILLOW	4800	5/01/99	---	27.3	12.2	7.3
BLACK MOUNTAIN	7750	4/27/99	44	16.7	16.6	17.8	MOSQUITO RDG PILLOW	5200	5/01/99	---	48.0	20.6	34.7
BLACK PINE PILLOW	7100	5/01/99	---	11.8	7.2	12.0	MOULTON RESERVOIR	6850	4/30/99	3	.8	.0	3.2
BLACKWALL PEAK CAN.	6370	5/01/99	---	50.4	24.5	36.3	MOUNT CRAG PILLOW	4050	5/01/99	---	50.0E	35.2	22.4
BLEWETT PASS#2PILLOW	4270	5/01/99	---	5.8	.5	4.9	MT. KOBAN CAN.	5500	4/29/99	53	19.7	18.3	13.1
BLUE LAKE	5900	4/25/99	62	29.8	7.9	23.9	MOUNT GARDNER PILLOW	2860	5/01/99	---	18.1	.0	10.8
BROWN TOP AM	6000	4/28/99	203	102.2	53.8	61.7	N.F. ELK CR PILLOW	6250	5/01/99	---	9.2	4.9	9.6
BRUSH CREEK TIMBER	5000	4/30/99	3	1.1	.0	6.0	NEVADA CREEK PILLOW	6480	5/01/99	---	17.9	9.4	12.5
BULL MOUNTAIN	6600	4/29/99	8	.8	.0	3.1	NEW HOZOMEEN LAKE	2800	4/30/99	36	13.8	.0	4.5
BUMPING LAKE (NEW)	3400	4/28/99	59	26.1	8.1	10.9	NEZ PERCE CMP PILLOW	5650	5/01/99	---	13.5	8.0	11.7
BUMPING RIDGE PILLOW	4600	5/01/99	---	54.8	25.6	18.9	NEZ PERCE PASS	6570	5/01/99	---	12.6E	12.4	15.6
HUNCHGRASS MDWPILLOW	5000	5/01/99	---	46.4	25.2	26.9	NOISY BASIN PILLOW	6040	5/01/99	---	44.4	34.7	44.0
CHESSMAN RESERVOIR	6200	4/28/99	2	.2	.0	2.4	NORTH FORK JOCKO	6330	4/30/99	93	44.5	29.8	44.6
CHICKEN CREEK	4060	4/29/99	29	11.9	.0	3.6	OLALLIE MDWS PILLOW	3960	5/01/99	---	89.4	49.9	51.0
CHINAKUM G.S.	2500	4/29/99	29	12.7	.0	1.0	OLALLIE MEADOWS	3630	5/01/99	---	75.0E	25.0	43.5
COMBINATION PILLOW	5600	5/01/99	---	.0	.0	3.2	OPHIR PARK	7150	5/02/99	35	14.8	6.2	17.4
COPPER BOTTOM PILLOW	5200	5/01/99	---	7.1	.0	8.1	PARADISE PARK PILLOW	5500	5/01/99	---	107.9	70.0	61.8
COPPER MOUNTAIN	7700	4/27/99	27	9.6	10.8	10.6	PARK CR RIDGE PILLOW	4600	5/01/99	---	70.2	33.4	33.6
CORRAL PASS PILLOW	6000	5/01/99	---	53.7	35.1	29.5	PETERSON MDW PILLOW	7200	5/01/99	---	12.8	12.2	11.3
COTTONWOOD CREEK	6400	4/30/99	27	8.1	8.5	7.6	PIGTAIL PEAK PILLOW	5900	5/01/99	---	76.0E	50.4	47.7
COUGAR MTN. PILLOW	3200	5/01/99	---	24.0	.6	9.3	PIKE CREEK PILLOW	5930	5/01/99	---	33.2	12.1	27.8
COX VALLEY	4500	4/29/99	181	74.3	37.9	39.1	PIPESTONE PASS	7200	4/28/99	21	7.0	7.4	5.0
COYOTE HILL	4200	5/03/99	4	1.0	.0	3.0	RAINY PASS PILLOW	4780	5/01/99	---	58.7	29.0	--
DAILY CREEK PILLOW	5780	5/01/99	---	5.5	6.3	5.8	REY RIVER PILLOW	1900	5/01/99	832	37.9	14.2	23.1
DEER PARK	5200	4/27/99	109	52.3	17.5	18.7	ROCKER PEAK PILLOW	8000	5/01/99	---	15.6	15.1	17.7
DEVILS PARK	5900	4/28/99	132	67.6	35.7	45.0	SADDLE MTN PILLOW	7900	5/01/99	---	28.7	22.6	27.6
DISCOVERY BASIN	7050	4/29/99	28	9.4	11.2	10.0	SAIMON MDWS PILLOW	4500	5/01/99	---	7.2	4.8	1.1
DIX HILL	6400	5/02/99	0	.0	.0	4.4	SASSE RIDGE PILLOW	4200	5/01/99	---	54.6	29.5	24.1
DOMMERIE FLATS	2200	4/29/99	0	.0	.0	--	SAVAGE PASS PILLOW	6170	5/01/99	---	31.5	17.8	26.7
EAST FORK R.S.	5400	5/02/99	0	.0	.0	.9	SCHREIBERS MDW AM	3400	5/01/99	---	84.3E	48.0	56.2
EAST RAGGED SADDLE	3740	5/02/99	35	15.4	.0	5.9	SHEEP CANYON PILLOW	4050	5/01/99	---	79.3	29.7	34.7
EASY PASS AM	5200	5/01/99	---	126.0E	93.0	85.4	SKALKAO PILLOW	7260	5/01/99	---	30.1	21.6	26.2
ELBOW LAKE PILLOW	3200	5/01/99	121	65.3	15.7	27.8	SKITWISH RIDGE	5110	5/04/99	84	38.0	11.2	30.3
EMERY CREEK PILLOW	4350	5/01/99	---	8.2	.3	8.5	SKOOKUM CREEK PILLOW	3920	5/01/99	---	44.8	7.5	26.4
ESPERON CK. MID CAN.	4250	5/01/99	36	17.0	6.3	9.9	SLIDE ROCK MOUNTAIN	7100	5/01/99	---	19.8E	13.6	17.2
ESPERON CK. UP CAN.	5050	5/01/99	48	22.8	11.4	15.2	SPENCER MDW PILLOW	3400	5/01/99	---	68.6	25.5	17.2
FARRON CAN.	3700	4/28/99	26	11.0	8.6	9.2	SPIRIT LAKE PILLOW	3100	5/01/99	---	5.1	.0	.3
FATTY CREEK	5500	4/30/99	55	21.9	16.8	23.6	SPOTTED HEAR MTN.	7000	4/25/99	22	9.6	.0	9.6
FISH CREEK	8000	4/30/99	43	15.2	14.7	12.4	STAHL PEAK PILLOW	6030	5/01/99	---	44.5	33.2	36.5
FISH LAKE PILLOW	3370	5/01/99	---	47.4	17.9	25.0	STAMPEDE PASS PILLOW	3860	5/01/99	---	60.5	33.8	39.1
FLATTOP MTN PILLOW	6300	5/01/99	---	58.3	36.0	48.4	STEMPLE PASS	6600	4/28/99	30	8.4	3.2	10.3
FLEEZR RIDGE	7500	4/29/99	27	10.7	6.2	8.4	STEVENS PASS PILLOW	4070	5/01/99	---	52.5	22.1	32.1
FOURTH OF JULY SUM	3200	4/26/99	0	.0	.0	.4	STEVENS PASS SAND SD	3700	4/29/99	97	44.5	17.2	28.7
FREEZEOUT CK. TRAIL	3500	4/30/99	40	14.0	3.9	7.0	STORM LAKE	7780	4/29/99	48	16.6	15.0	15.0
FROHNER MDWS PILLOW	6480	5/01/99	---	6.8	5.2	7.1	STRYKER BASIN	6180	4/29/99	81	38.6	29.7	35.8
GRAVE CRK PILLOW	4300	5/01/99	---	9.4	2.4	9.0	STUART MOUNTAIN	7400	4/30/99	82	37.8	27.6	32.3
GRAYSTOKE LAKE CAN.	5500	4/28/99	50	19.3	9.4	17.0	SUNSET PILLOW	5540	5/01/99	---	24.4	11.7	26.8
GREEN LAKE PILLOW	6000	5/01/99	86	40.9	23.8	SURPRISE LKS PILLOW	4250	5/01/99	---	82.4	45.3	36.1	
GRIFFIN CR DIVIDE	5150	4/26/99	9	3.4E	.0	6.3	TEN MILE LOWER	6600	4/28/99	10	2.0	1.9	5.4
GROUSE CAMP PILLOW	5380	5/01/99	---	30.1	12.0	9.2	TEN MILE MIDDLE	6800	4/28/99	32	8.6	8.2	12.4
HAND CREEK PILLOW	5030	5/01/99	---	6.3	.0	8.3	THUNDER BASIN	4200	4/30/99	93	41.4	16.0	21.8
HARTS PASS PILLOW	6500	5/01/99	---	65.7	42.4	42.0	TINKHAM CREEK PILLOW	3000	5/01/99	---	35.0E	15.0	16.7
HELL ROARING DIVIDE	5770	4/29/99	69	30.1	19.6	30.1	TOUCHE #2 PILLOW	5530	5/01/99	---	48.6	18.3	27.3
HERRING JUNCTION	4850	4/29/99	64	30.4	17.0	23.2	TRINKUS LAKE	6100	4/25/99	94	46.0	27.4	43.1
HIGH RIDGE PILLOW	4980	5/01/99	---	16.9	7.8	12.4	TROUGH #2 PILLOW	5310	5/01/99	---	7.7	7.8	2.5
HOLBROOK	4530	5/01/99	---	.0E	.0	1.7	TRUMAN CREEK	4060	4/27/99	0	.0	.0	.6
HOODOO BASIN PILLOW	6050	5/01/99	---	63.0	31.5	47.2	TUNNEL AVENUE	2450	4/28/99	65	31.4	6.0	12.7
HUMBOLDT GLCH PILLOW	4250	5/01/99	---	13.4	1.5	8.9	TV MOUNTAIN	6800	4/30/99	47	19.8	13.4	18.7
HURRICANE	4500	4/30/99	112	53.6	15.2	21.9	TWELVEMILE PILLOW	5600	5/01/99	---	10.2	.2	12.4
INTERGAARD	6450	4/28/99	18	5.8	7.4	7.2	TWIN CREEKS	3580	4/25/99	7	2.9	.0	1.8
JUNE LAKE PILLOW	3200	5/01/99	---	75.4	21.6	19.6	TWIN LAKES PILLOW	6400	5/01/99	---	51.8	29.3	39.8
KLESILKWA CAN.	3450	4/28/99	38	17.5	.0	6.9	TWIN SPIRIT DIVIDE	3480	5/02/99	16	6.5	.0	--
KRAFT CREEK PILLOW	4750	5/01/99	---	5.3	.0	5.8	UPPER HOLLAND LAKE	6200	4/25/99	80	37.8	24.8	35.2
LIGHTNING LAKE CAN.	3700	4/28/99	45	19.1	7.2	10.0	UPPER WHEELER PILLOW	4400	5/01/99	---	14.0	6.9	4.8
LOGAN CREEK	4300	4/28/99	3	1.0	.0	2.2	WARM SPRINGS PILLOW	7800	5/01/99	---	24.9	21.2	24.9
LOLO PASS PILLOW	5240	5/01/99	---	38.2	14.0	27.5	WATSON LAKES AM	4500	5/01/99	---	104.0E	59.0	--
LONE PINE PILLOW	3800	5/01/99	---	86.6	35.3	26.4	WEASEL DIVIDE	5450	4/30/99	82	40.2	22.2	--
LOOKOUT PILLOW	5140	5/01/99	---	41.6	18.7	29.3	WELLS CREEK PILLOW	4200	5/01/99	115	53.7	21.0	--
LOST HORSE MTN CAN.	5850	5/01/99	35	11.7	7.7	9.8	WHITE PASS ES PILLOW	4500	5/01/99	---	33.0	18.2	--
LOST HORSE PILLOW	5000	5/01/99	---	29.5	16.2	8.2							
LOWER SANDS CREEK #2	3120	5/03/99	61	25.9	8.7	16.7							
LUBRECHT FOREST NO 3	5450	4/29/99	1	.4	.0	3.0							



Natural Resources Conservation Service

Washington State  
Snow, Water and Climate Services

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### Helpful Internet Addresses

#### NRCS Snow Survey and Climate Services Homepages

Washington:

<http://www.wa.nrcs.usda.gov/nrcs/CoopSnoSrvy.htm>

Oregon:

<http://crystal.or.nrcs.usda.gov/snowsurveys>

Idaho:

<http://idsnow.id.nrcs.usda.gov>

National Water and Climate Center (NWCC):

<http://www.wcc.nrcs.usda.gov>

NWCC Anonymous FTP Server:

<ftp://ftp.wcc.nrcs.usda.gov>

#### USDA-NRCS Agency Homepages

Washington:

<http://www.wa.nrcs.usda.gov/nrcs>

NRCS National:

<http://www.ftw.nrcs.usda.gov>



Natural Resources Conservation Service

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Snow, Water and Climate Services

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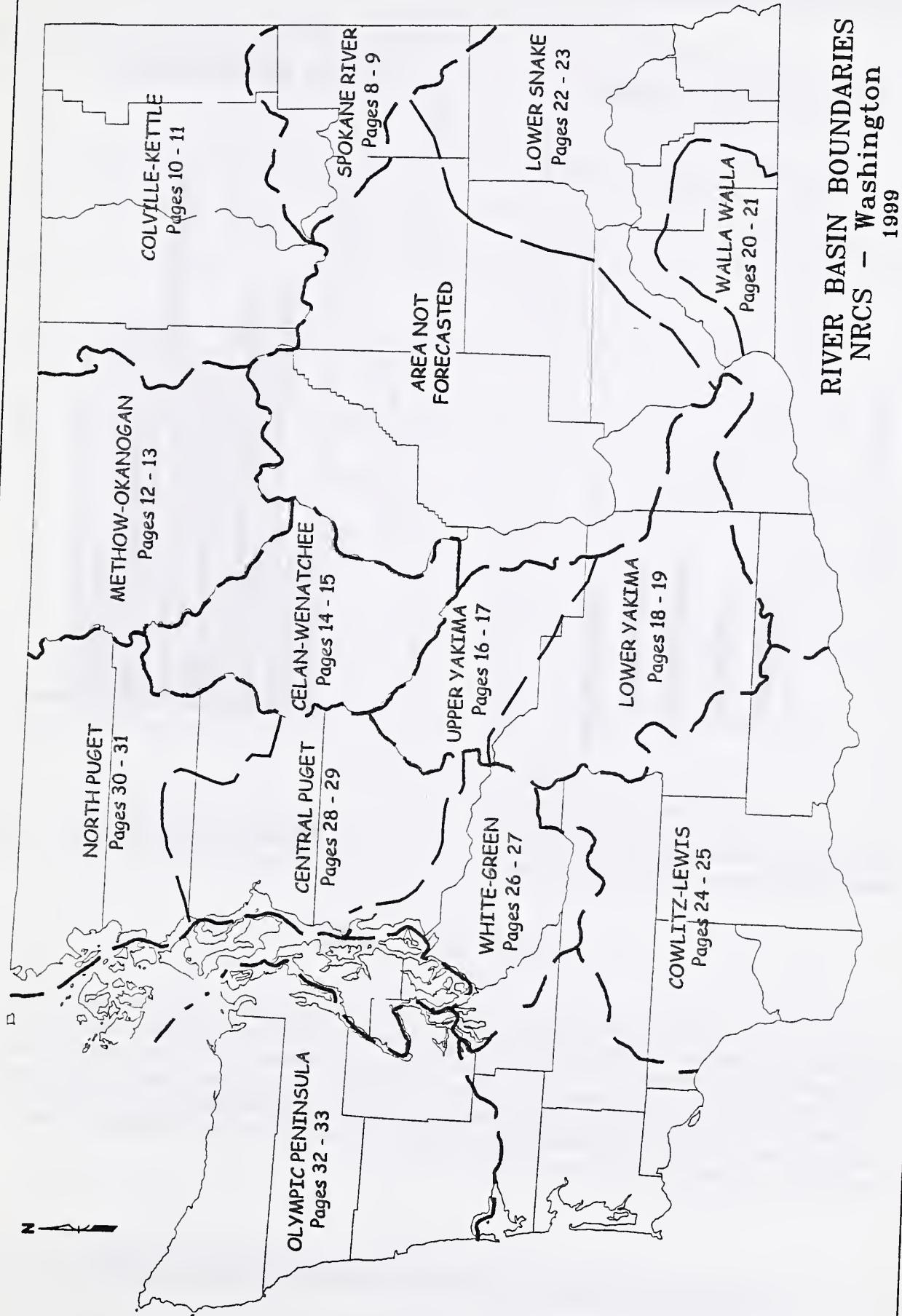
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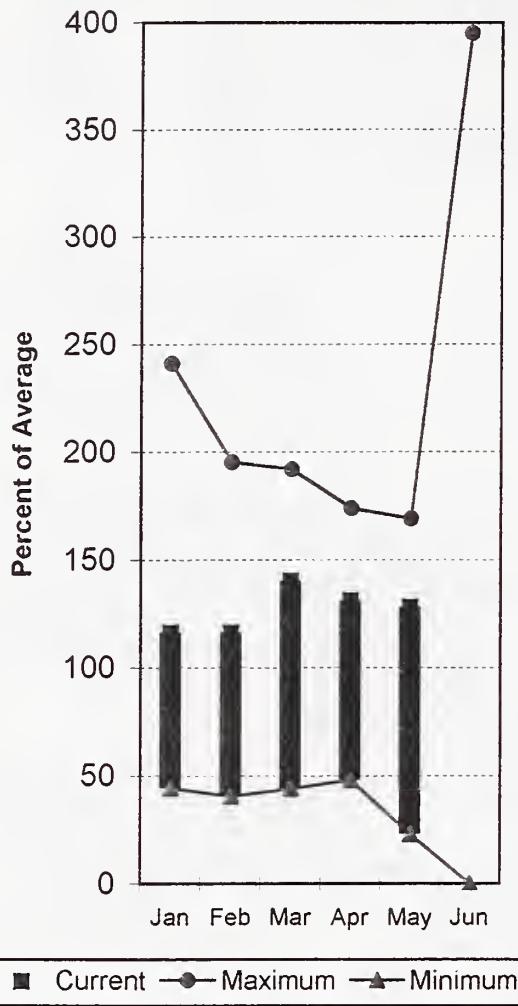
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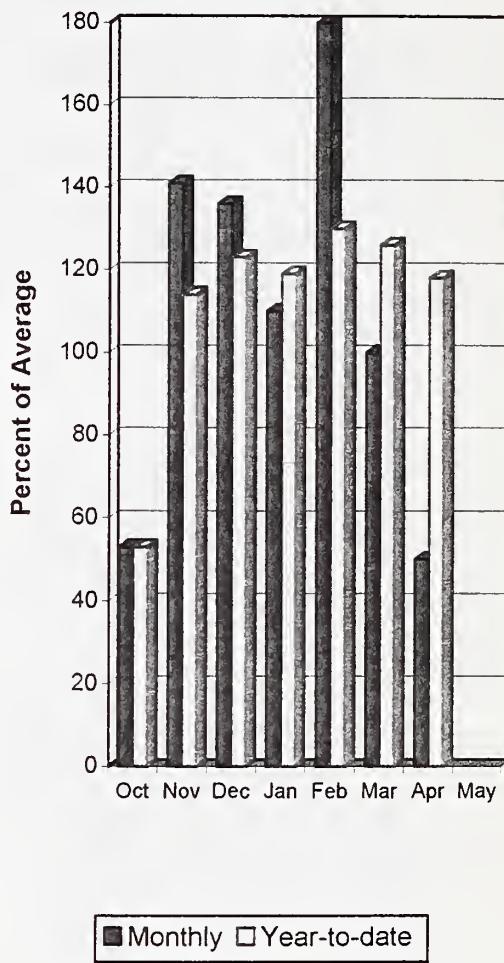
RIVER BASIN BOUNDARIES  
NRCS - Washington  
1999

# Spokane River Basin

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

The May 1 forecasts for summer runoff within the Spokane River Basin are 134% of average near Post Falls and 130% of average at Long Lake. The forecasts are based on a basin snowpack that is 128% of average and precipitation that is 118% of average for the water-year. Precipitation for April was 50% of average. Streamflow for the Spokane River at Long Lake, was 103% of average for April. May 1 storage in Coeur d'Alene Lake, was 284,500-acre feet, 115% of average and 119% of capacity. Snowpack at Quartz Peak SNOTEL site contained 24.9 inches of water, compared to the average May 1 reading of 18.6 inches. Average temperatures in the Spokane Basin were about 2 degrees below normal.

# Spokane River Basin

## Streamflow Forecasts - May 1, 1999

SPOKANE near Post Falls (2)	MAY-SEP	2109	2330		2480	134		2630	2851	1846
	MAY-JUL	2005	2222		2370	136		2518	2735	1749
SPOKANE at Long Lake	MAY-JUL	2218	2445		2600	132		2755	2982	1975
	MAY-SEP	2459	2692		2850	130		3008	3241	2198

SPOKANE RIVER BASIN | SPOKANE RIVER BASIN  
Reservoir Storage (1000 AF) - End of April | Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Capacity	Usable Storage			Watershed	Number of Data Sites	This Year as % of	
	This Year	Last Year	Avg	Last Yr			Average	
COEUR D'ALENE	238.5	284.5	181.5	246.7	SPOKANE RIVER	11	253	128
					NEWMAN LAKE	1	257	134

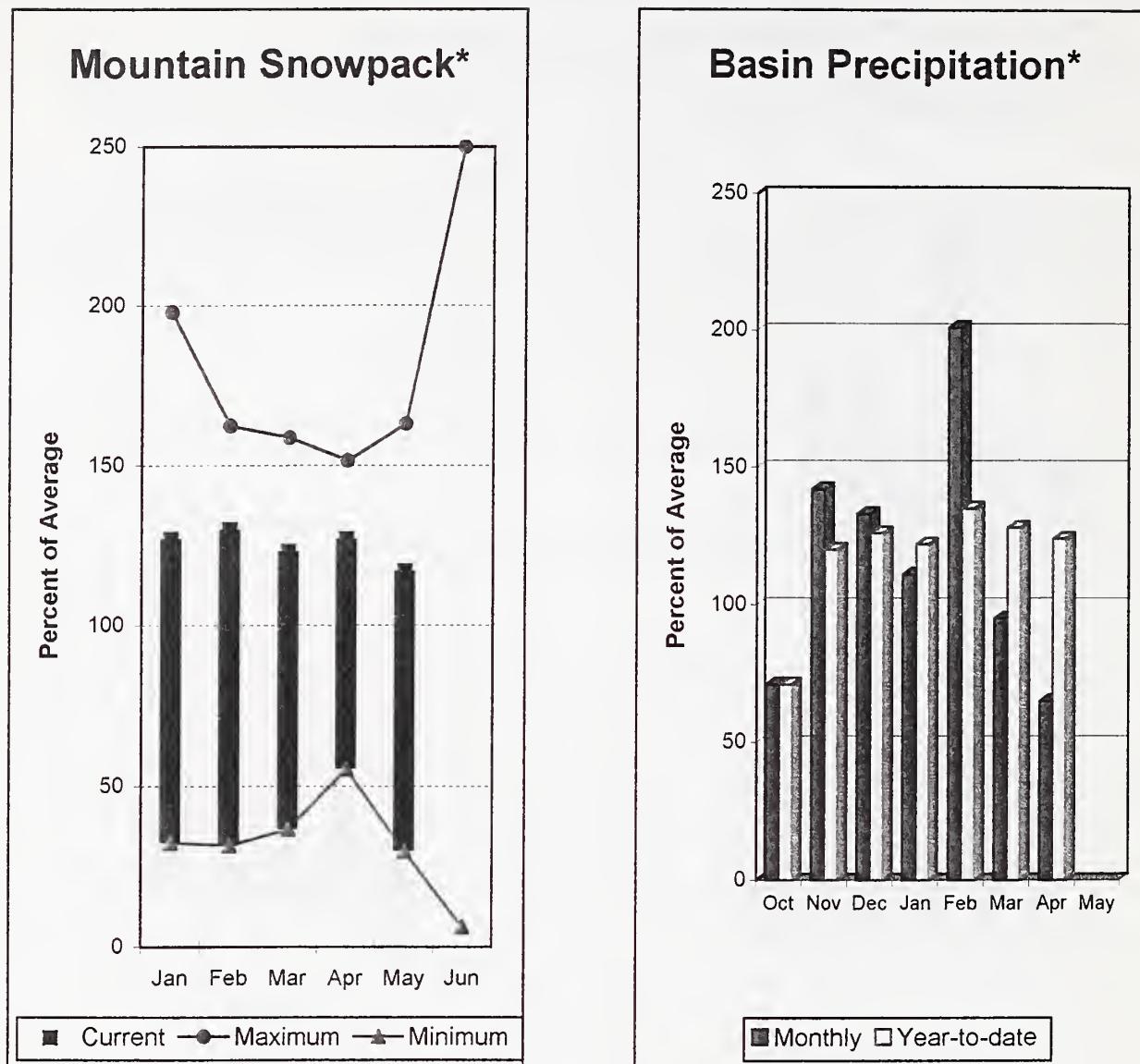
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.

(2) - The value is natural flow - actual flow may be affected by upstream water management.

# Colville - Pend Oreille River Basins



\*Based on selected stations

The May - September forecast for the Kettle River streamflow is 123% of average; the Pend Oreille below Box Canyon, 113%; and the Colville River at Kettle Falls, 202% of average. April streamflow was 95% of average on the Pend Oreille River; 113% on the Columbia at the International Boundary; and 157% on the Kettle River. May 1 snow cover was 112% of average in the Pend Oreille Basin and 121% of average in the Kettle River Basin. Bunchgrass Meadows SNOTEL site recorded 46.4 inches of snow-water-equivalent on May 1. Average May 1 snowpack for Bunchgrass Meadows is 26.9 inches. Precipitation during April was 65% of average, bringing the year-to-date precipitation to 124% of average. Reservoir storage in Roosevelt Lake was 92% of capacity and 336% of average on May 1. Average temperatures were about 2 degrees below normal for the month.

For more information contact your local Natural Resources Conservation Service office.

# Colville - Pend Oreille River Basins

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg. (1000AF)	
		<===== Drier =====		Chance Of Exceeding *		Wetter =====>			
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(8 AVG.)	30% (1000AF)	10% (1000AF)		
PEND OREILLE Lake Inflow (1,2)	MAY-JUL	10845	12189	12800	116	13411	14755	11070	
	MAY-SEP	11930	13422	14100	115	14778	16270	12290	
PRIEST nr Priest River (1,2)	MAY-SEP	620	730	780	115	830	940	680	
PEND OREILLE bl Box Canyon (1,2)	MAY-JUL	10165	11839	12600	112	13361	15035	11220	
	MAY-SEP	11305	13158	14000	113	14842	16695	12430	
	MAY-JUN	8567	9965	10600	113	11235	12633	9410	
COLVILLE at Kettle Falls	MAY-SEP	145	160	170	202	181	196	84	
	MAY-JUL	128	141	150	206	159	172	73	
	MAY-JUN	113	124	131	205	136	149	64	
KETTLE near Laurier	MAY-SEP	1682	1842	1950	123	2058	2218	1582	
	MAY-JUL	1600	1737	1830	123	1923	2060	1489	
	MAY-JUN	1427	1539	1615	123	1691	1803	1314	
COLUMBIA at Birchbank (1,2)	MAY-JUL	32732	34979	36000	112	37021	39268	32090	
	MAY-SEP	41636	44499	45800	112	47101	49964	40760	
	MAY-JUN	23014	24586	25300	112	26014	27586	22620	
COLUMBIA at Grand Coulee Dm (1,2)	MAY-SEP	60423	64602	66500	115	68398	72577	57921	
	MAY-JUL	49713	53142	54700	115	56258	59687	47614	
	MAY-JUN	37463	40033	41200	115	42367	44937	35827	

COLVILLE - PEND OREILLE RIVER BASINS Reservoir Storage (1000 AF) - End of April			COLVILLE - PEND OREILLE RIVER BASINS Watershed Snowpack Analysis - May 1, 1999		
Reservoir	Usable Capacity	*** Usable Storage ***	Watershed	Number of Data Sites	This Year as % of Last Yr Average
	This Year	Last Year	Avg		

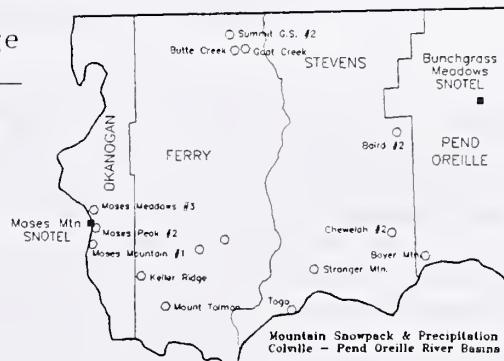
ROOSEVELT	5232.0	4800.0	4160.0	1310.0	COLVILLE RIVER	0	0	0
BANKS		NO REPORT			PEND OREILLE RIVER	90	169	112
					KETTLE RIVER	4	158	121

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

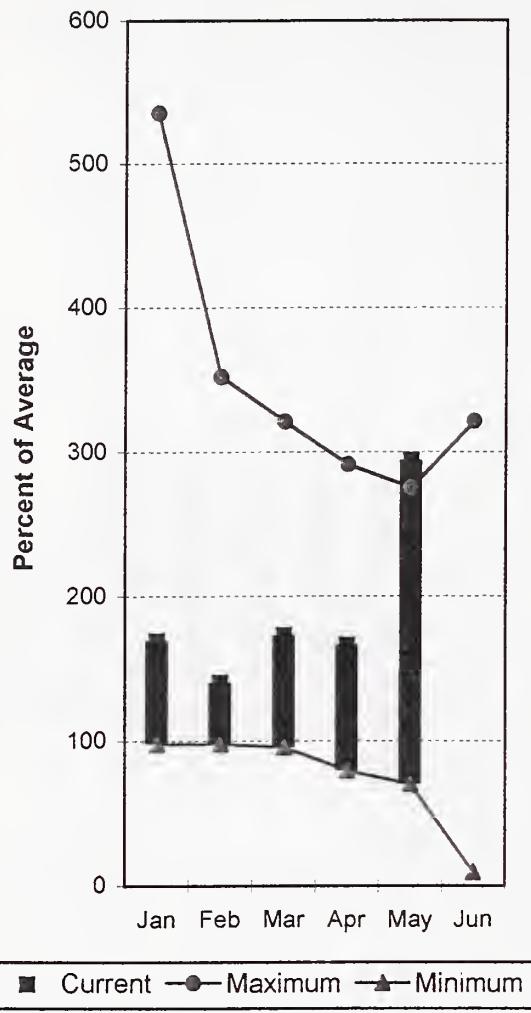
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Water-Year  
Percent of Average  
May 1, 1999  
Snowpack - 117%  
Precipitation - 124%  
Reservoir - 366%

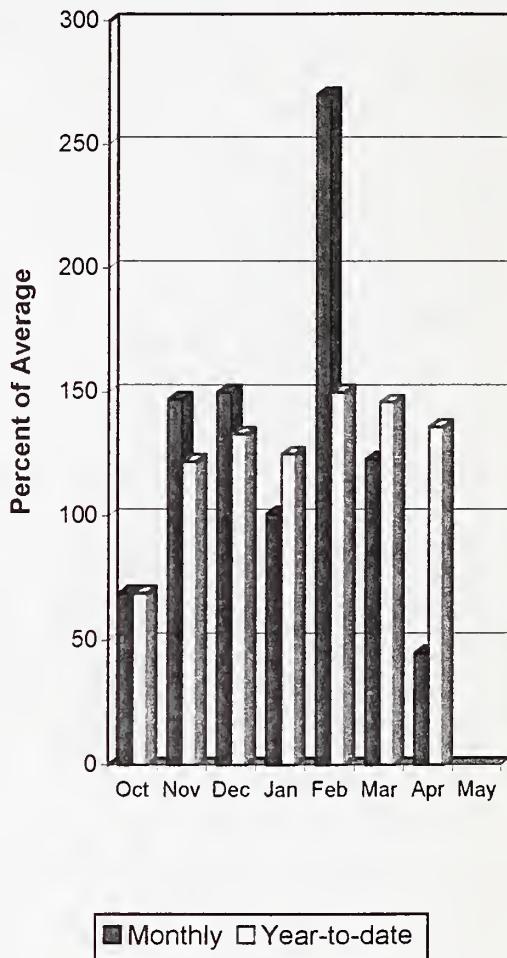


# Okanogan - Methow River Basins

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

Summer runoff forecast for the Okanogan River is for 127% of average; the Similkameen River, 131%; the Methow River, 155%; and Salmon Creek, 146% of average. May 1 snow cover in the Okanogan Basin was 143% of average; the Methow, 165%; and the Similkameen Basin, 131%. Harts Pass SNOTEL site had a May 1 reading of 65.7 inches or 156% of average. April precipitation in the Okanogan-Methow was 45% of average, with precipitation for the water-year at 136% of average. April streamflow for the Methow River was 144% of average; 170% for the Okanogan River; and 140% for the Similkameen. Snow-water-content at the Salmon Meadows SNOTEL, near Conconully, was 7.2 inches. Average for this site is 1.1 inches on May 1. Combined storage in the Conconully Reservoirs was 20,500-acre feet, which is 87% of capacity and 128% of the May 1 average. Temperatures were slightly below normal for the past month.

*For more information contact your local Natural Resources Conservation Service office.*

# Okanogan - Methow River Basins

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg.	
		<<---- Drier -----		Chance Of Exceeding *		Wetter ----->>			
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	% AVG.	30% (1000AF)	10% (1000AF)		
SIMILKAMEEN near Nighthawk (1)	MAY-JUL	1290	1483	1570	130	1657	1850	1205	
	MAY-SEP	1413	1610	1700	131	1790	1987	1300	
	MAY-JUN	1068	1248	1330	131	1412	1592	1014	
OKANOGAN near Tonasket (1)	MAY-JUL	1201	1537	1690	127	1843	2179	1328	
	MAY-SEP	1353	1719	1885	127	2051	2417	1484	
	MAY-JUN	971	1259	1390	127	1521	1809	1094	
SALMON CREEK near Conconully	MAY-JUL	16.2	22	26	146	30	36	18.0	
	MAY-SEP	17.0	23	28	146	32	38	18.9	
METHOW RIVER near Pateros	MAY-SEP	1213	1277	1320	155	1363	1427	854	
	MAY-JUL	1135	1192	1230	157	1268	1325	786	
	MAY-JUN	946	999	1035	157	1071	1124	659	

## OKANOGAN -' METHOW RIVER BASINS

Reservoir Storage (1000 AF) - End of April

## OKANOGAN - METHOW RIVER BASINS

Watershed Snowpack Analysis - May 1, 1999

Reservoir	Capacity	Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
SALMON LAKE	10.5	7.4	10.3	8.0	OKANOGAN RIVER	19	174	143
CONCONULLY RESERVOIR	13.0	13.1	13.5	8.0	OMAK CREEK	1	224	374
					SANPOIL RIVER	0	0	0
					SIMILKAMEEN RIVER	5	229	131
					TOATS COULEE CREEK	0	0	0
					CONCONULLY LAKE	1	150	655
					METHOW RIVER	3	173	165

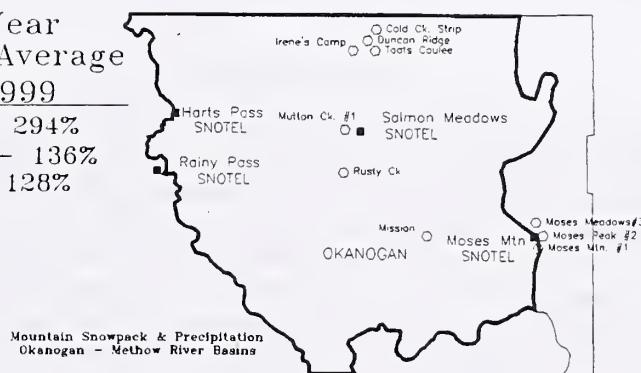
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.

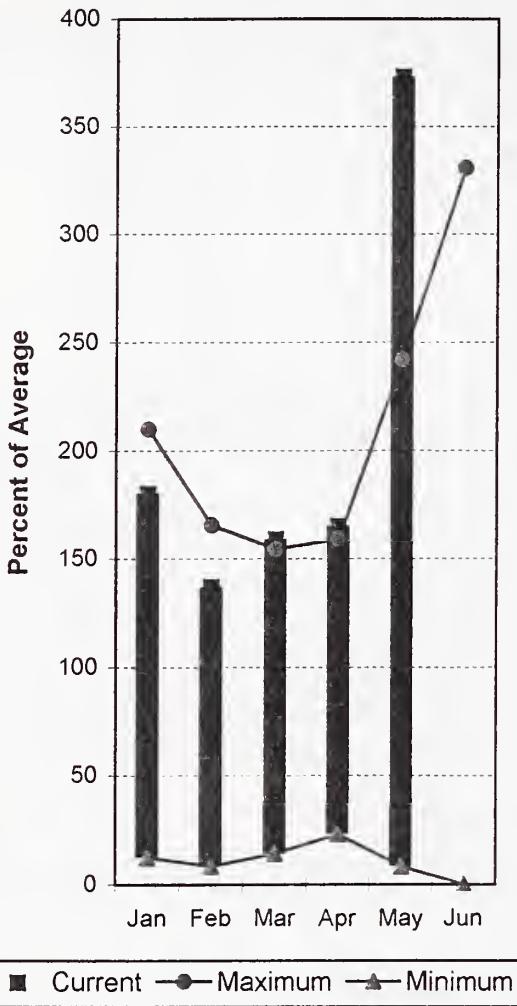
(2) - The value is natural flow - actual flow may be affected by upstream water management.

Water-Year  
Percent of Average  
May 1, 1999  
Snowpack - 294%  
Precipitation - 136%  
Reservoir - 128%

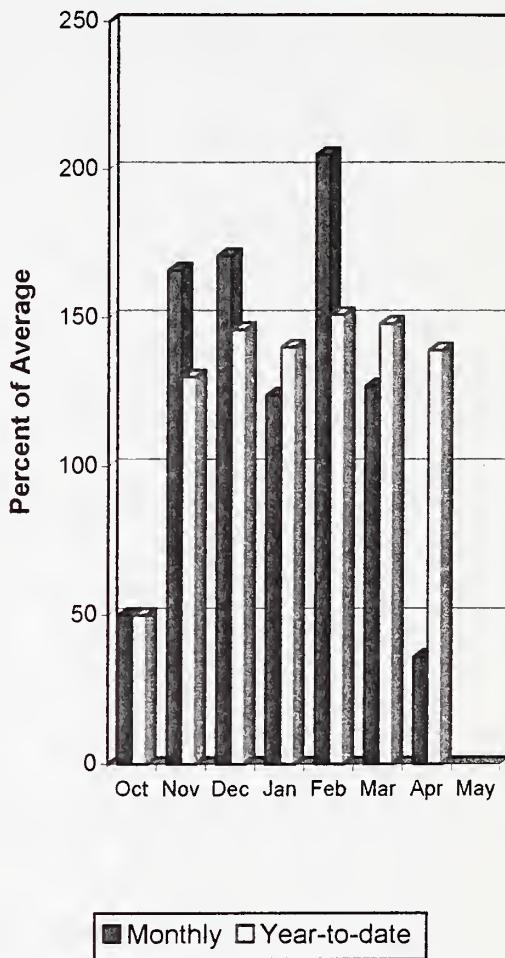


# Wenatchee - Chelan River Basins

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

Precipitation during April was 36% of average in the combined basins and 139% for the year-to-date. Runoff for the Entiat River is forecast to be 156% of average for the summer. The May-September forecast for the Chelan River streamflow is for 145% of average; it is 145% for the Wenatchee River at Plain; and for the Stehekin it is 143% of average. Icicle, Stemilt and Squilchuck creeks are all expected to be above average this summer as well. April streamflows on the Chelan River were 99% of average. The Wenatchee River averaged 96% of normal flows. May 1 snowpack in the Wenatchee Basin was 198% of average. The Chelan Basin was 163% of average; Colockum Ridge was 308%; and Stemilt Creek was 292% of average. Snowpack in the Entiat River Basin was 1206% of average. Reservoir storage in Lake Chelan was 172,600-acre feet, or 38% of May 1 average and 26% of capacity. Lyman Lake SNOTEL had the most snow water equivalent with 96.9 inches of water. This site would normally have 58.7 inches on May 1. Temperatures were 1-2 degrees below normal for April.

For more information contact your local Natural Resources Conservation Service office.

# Wenatchee - Chelan River Basins

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg. (1000AF)	
		<===== Drier =====		Chance Of Exceeding *		Wetter =====>			
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(# AVG.)	30% (1000AF)	10% (1000AF)		
CHELAN RIVER near Chelan	MAY-SEP	1399	1465	1510	145	1555	1621	1041	
	MAY-JUL	1231	1292	1334	147	1376	1437	905	
	MAY-JUN	909	975	1020	147	1065	1131	693	
STEHEKIN near STEHEKIN	MAY-SEP	996	1042	1074	143	1106	1152	781	
	MAY-JUL	817	863	894	143	925	971	625	
	MAY-JUN	578	627	660	143	693	742	462	
ENTIAT RIVER near Ardenvoir	MAY-SEP	302	315	324	156	333	346	208	
	MAY-JUL	270	283	292	155	301	314	188	
	MAY-JUN	207	220	230	153	240	253	150	
WENATCHEE at Plain	MAY-SEP	1385	1459	1510	145	1561	1635	1042	
	MAY-JUL	1244	1302	1341	145	1380	1438	925	
	MAY-JUN	964	1009	1040	145	1071	1116	716	
STEMILT nr Wenatchee (miners in)	MAY-SEP	145	172	190	138	208	235	138	
ICICLE CREEK near Leavenworth	MAY-SEP	428	438	445	146	452	462	305	
	MAY-JUL	384	398	408	146	418	432	279	
	MAY-JUN	286	312	330	147	348	374	224	
COLUMBIA R. bl Rock Island Dam (2)	MAY-SEP	67398	71627	74500	118	77373	81602	62387	
	MAY-JUL	55920	59421	61800	118	64179	67680	52239	
	MAY-JUN	42173	44809	46600	118	48391	51027	39509	

WENATCHEE - CHELAN RIVER BASINS  
Reservoir Storage (1000 AF) - End of April | WENATCHEE - CHELAN RIVER BASINS  
Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of Last Yr Average	
		This Year	Last Year	Avg			Last Yr	Average
CHELAN LAKE	676.1	172.6	312.8	448.8	CHELAN LAKE BASIN	3	179	163
					ENTIAT RIVER	1	199	1206
					WENATCHEE RIVER	10	257	198
					SQUILCHUCK CREEK	0	0	0
					STEMILT CREEK	1	203	292
					COLOCKUM CREEK	1	99	308

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

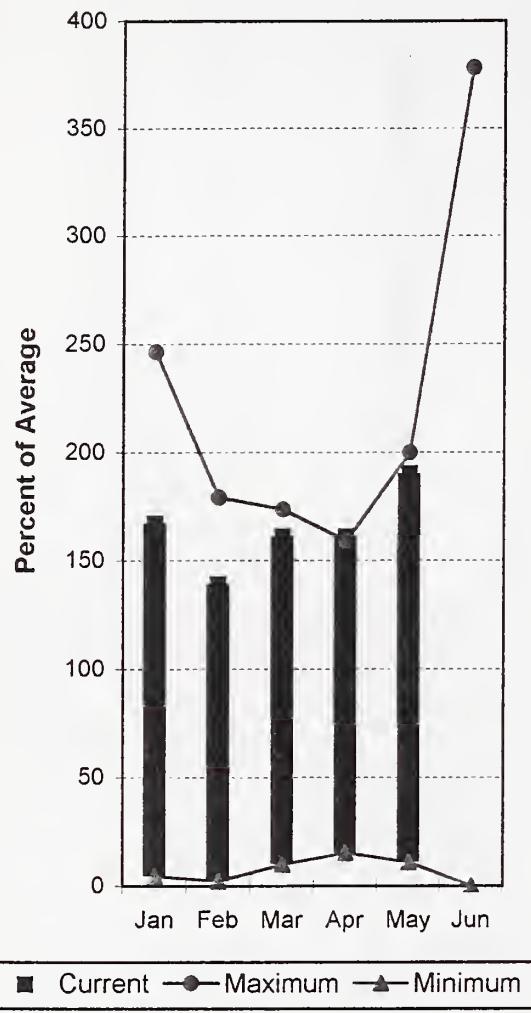
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(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.

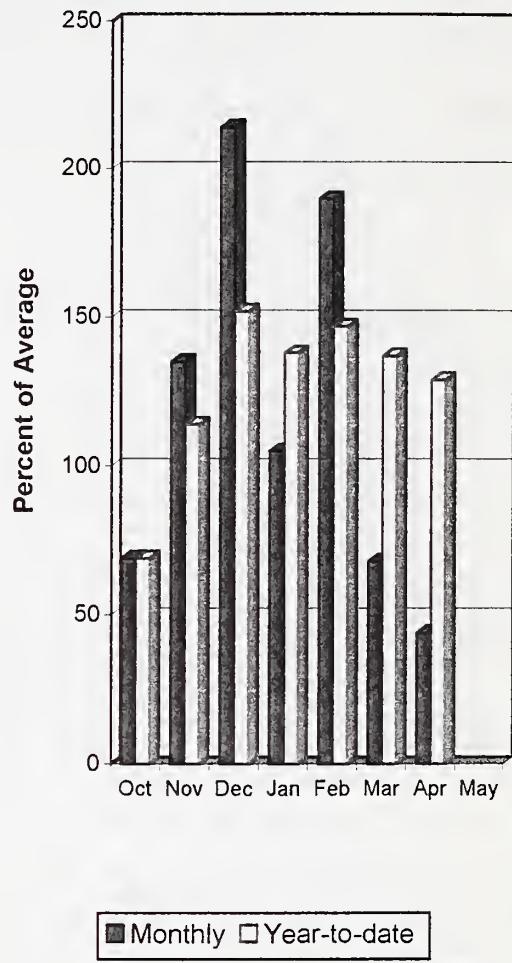
(2) - The value is natural flow - actual flow may be affected by upstream water management.

# Upper Yakima River Basin

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

May 1 reservoir storage for the Upper Yakima reservoirs was 519,800-acre feet, or 83% of average. Forecasts for the Yakima River at Cle Elum are for 139% of average. Lake inflows are all expected to be much above average this summer. April streamflows within the basin were: the Yakima near Cle Elum 88% and the Cle Elum River near Roslyn at 80%. May 1 snowpack was 190% based upon 9 snow courses and SNOTEL readings within the Upper Yakima Basin. Precipitation was only 44% of average for April and 129% for the water-year-to-date. Temperatures were 2 degrees below normal. Volume forecasts for the Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

# Upper Yakima River Basin

Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg.	
		Drier		Chance Of Exceeding *					
		90%	70%	50% (Most Probable)	30%	10%			
		(1000AF)	(1000AF)	(1000AF)	(% AVG.)	(1000AF)	(1000AF)	(1000AF)	
KEECHELUS LAKE INFLOW	MAY-JUL	127	137	144	150	150	160	96	
	MAY-SEP	137	150	158	148	166	179	107	
	MAY-JUN	105	115	122	151	129	139	81	
KACHESS LAKE INFLOW	MAY-JUL	111	117	122	142	127	134	86	
	MAY-SEP	117	126	131	142	137	145	92	
	MAY-JUN	94	101	105	142	109	116	74	
CLE ELUM LAKE INFLOW	MAY-JUL	450	468	481	142	494	512	339	
	MAY-SEP	497	520	535	142	550	573	378	
	MAY-JUN	358	378	392	142	406	426	276	
YAKIMA at Cle Elum	MAY-JUN	696	734	760	139	786	824	546	
	MAY-JUL	846	887	915	139	943	984	657	
	MAY-SEP	943	995	1030	139	1065	1117	740	

UPPER YAKIMA RIVER BASIN  
Reservoir Storage (1000 AF) - End of April

UPPER YAKIMA RIVER BASIN  
Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Storage			Watershed	Number of Data Sites	This Year as % of	
	Capacity	This Year	Last Year			Last Yr	Average
KEECHELUS	157.8	81.0	150.2	119.0	UPPER YAKIMA RIVER	9	227 190
KACHESS	239.0	183.5	214.9	197.0			
CLE ELUM	436.9	255.3	407.0	308.0			

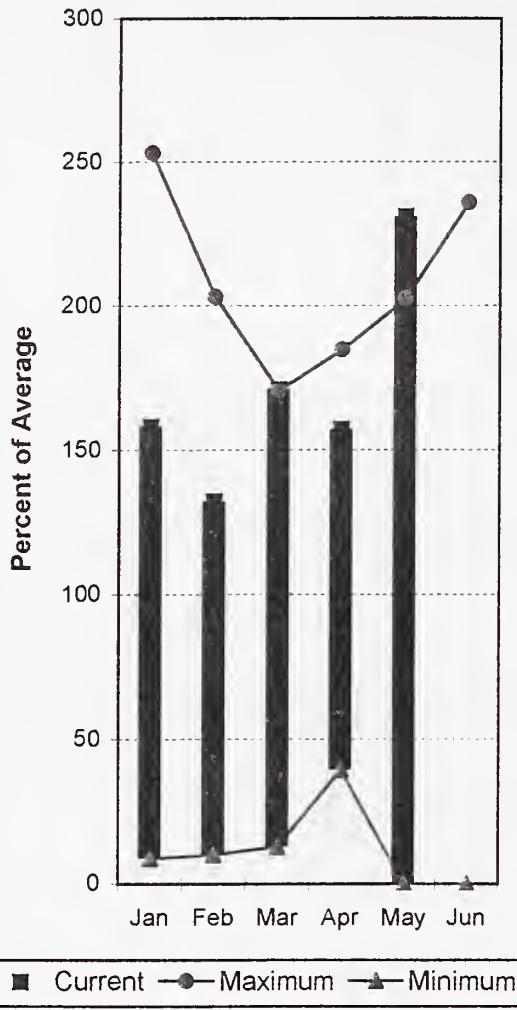
, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

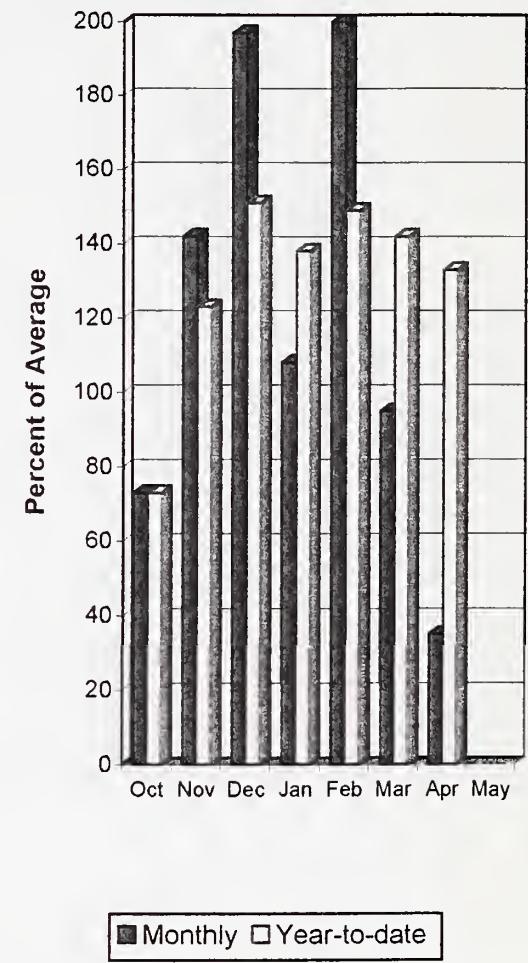
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
 (2) - The value is natural flow - actual flow may be affected by upstream water management.

# Lower Yakima River Basin

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

April streamflows within the basin were: the Yakima River near Parker, 99%; the Naches River near Naches, 111%; and the Yakima at Kiona, 118% of average. May 1 reservoir storage for the Bumping and Rimrock reservoirs was 140,100-acre feet, or 88% of average. May 1 snowpack was 210% based upon 6 snow courses and SNOTEL readings within the Lower Yakima Basin and 252% of average in the Ahtanum Creek Basin. Precipitation was 35% of average for April and 133% for the water-year-to-date. Temperatures for the month were 2 degrees below normal. Forecasts for the Yakima River at Parker are for 147% of average; American River near Nile, 130%; Ahtanum Creek, 134%; and the Klickitat River near Glenwood, 179%. Volume forecasts for the Yakima Basin are for natural flow. As such, they may differ from the U.S. Bureau of Reclamation's forecast for the total water supply available, which includes irrigation return flow.

# Lower Yakima River Basin

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg.	
		<===== Drier =====		Chance Of Exceeding *		Wetter =====>			
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)		
BUMPING LAKE INFLOW	MAY-SEP	162	173	180	154	187	198	117	
	MAY-JUL	151	159	165	156	171	179	106	
	MAY-JUN	122	129	134	156	139	146	86	
AMERICAN RIVER near Nile	MAY-SEP	118	127	133	130	139	148	102	
	MAY-JUL	107	115	121	131	126	134	92	
	MAY-JUN	84	92	98	131	104	112	75	
RIMROCK LAKE INFLOW	MAY-SEP	244	259	270	132	281	296	204	
	MAY-JUL	205	216	224	134	232	243	167	
	MAY-JUN	153	164	171	134	178	189	128	
NACHES near Naches	MAY-SEP	951	1004	1040	152	1076	1129	686	
	MAY-JUL	859	902	932	153	962	1005	609	
	MAY-JUN	707	746	773	153	800	839	505	
AHTANUM CREEK nr Tampico (2)	MAY-SEP	43	48	51	134	54	60	38	
	MAY-JUL	38	43	46	134	49	53	34	
	MAY-JUN	32	35	38	135	40	44	28	
YAKIMA near Parker	MAY-SEP	2147	2250	2320	147	2390	2493	1580	
	MAY-JUL	1915	2007	2070	149	2133	2225	1390	
	MAY-SEP	2147	2250	2320	147	2390	2493	1580	
KLICKITAT near Glenwood	MAY-JUN	141	149	155	178	161	170	87	
	MAY-SEP	190	201	209	179	217	228	117	

### LOWER YAKIMA RIVER BASIN

Reservoir Storage (1000 AF) - End of April

### LOWER YAKIMA RIVER BASIN

Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of Last Yr	Average
		This Year	Last Year	Avg				
BUMPING LAKE	33.7	10.3	21.2	15.0				
RIMROCK	198.0	129.8	165.1	144.0				

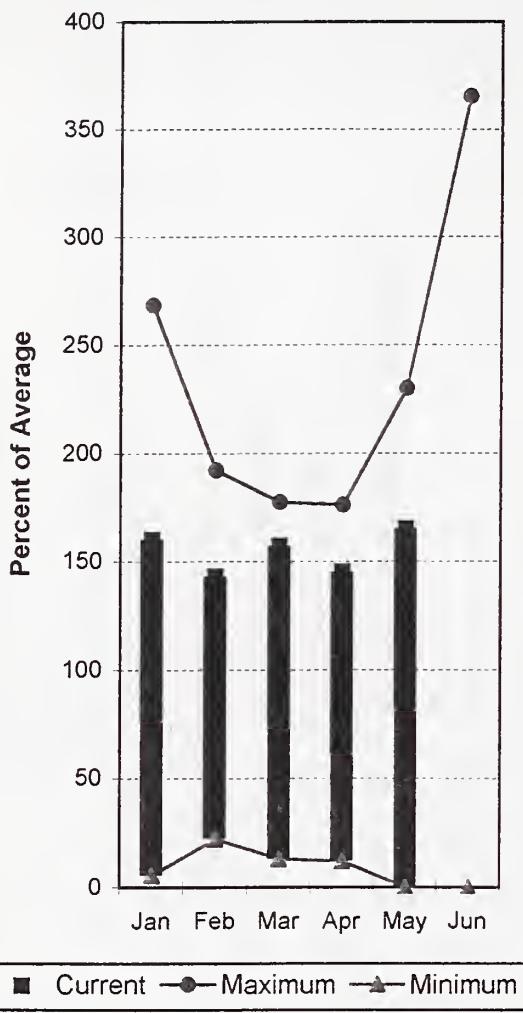
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

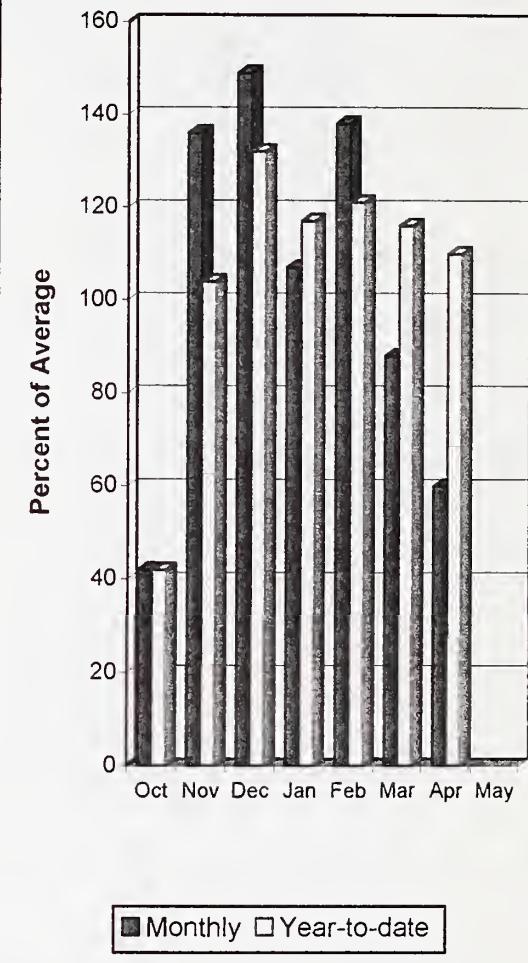
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural flow - actual flow may be affected by upstream water management.

# Walla Walla River Basin

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

April precipitation was 60% of average, bringing the year-to-date precipitation to 110% of average. May 1 snowpack was at 165% of average. The forecast is for 127% of average streamflow in the South Fork Walla Walla River and 170% for Mill Creek, during the coming summer. April streamflow was 203% of average for the Walla Walla River. The Touchet SNOTEL site had 48.6 inches of snow-water-equivalent. The average May 1 reading for this site is 27.3 inches. Average temperatures were 3 degrees below normal for the area.

# Walla Walla River Basin

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<===== Drier ===== Future Conditions ===== Wetter =====>				30-Yr Avg.	
		Chance Of Exceeding *		30% 10%			
		90% (1000AF)	70% (1000AF)	(1000AF) (% AVG.)	(1000AF) (1000AF)		
MILL CREEK at Walla Walla	MAY-SEP	9.57	11.46	12.75	170	14.04 15.93 7.50	
	MAY-JUL	9.30	11.19	12.47	171	13.75 15.64 7.30	
	MAY-JUN	9.12	10.91	12.13	171	13.35 15.14 7.10	
SF WALLA WALLA near Milton-Freewater	MAY-JUL	42	46	49	132	52 56 37	
	MAY-SEP	56	61	64	127	67 72 50	

WALLA WALLA RIVER BASIN  
Reservoir Storage (1000 AF) - End of April | WALLA WALLA RIVER BASIN  
Watershed Snowpack Analysis - May 1, 1999

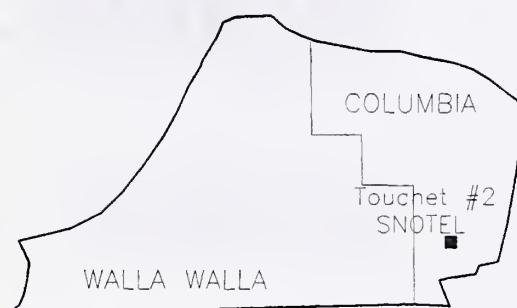
Reservoir	Usable Capacity	*** Usable Storage ***			Number of Data Sites	This Year as % of Last Yr	Average
		This Year	Last Year	Avg			
					WALLA WALLA RIVER	2	251 165

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.  
(2) - The value is natural flow - actual flow may be affected by upstream water management.

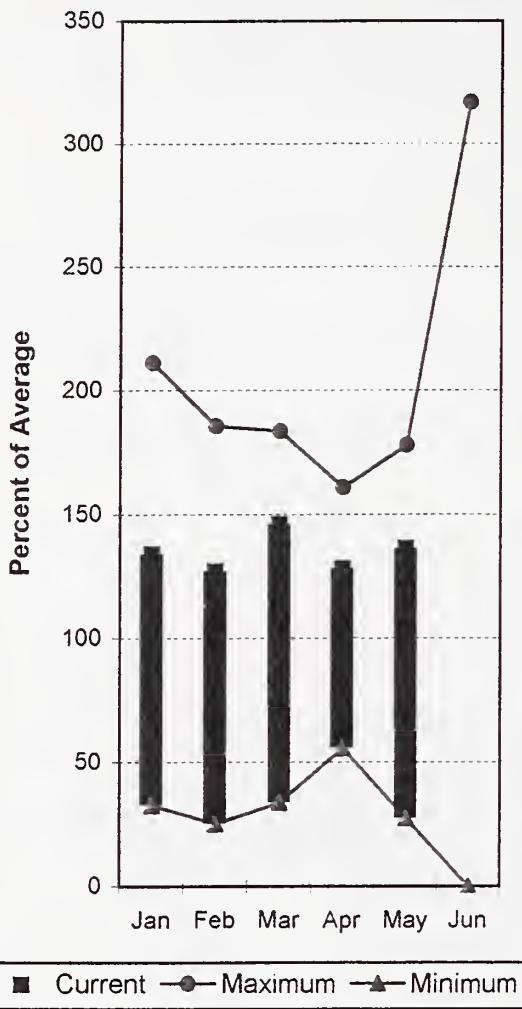
Water-Year  
Percent of Average  
May 1, 1999  
Snowpack - 165%  
Precipitation - 110%



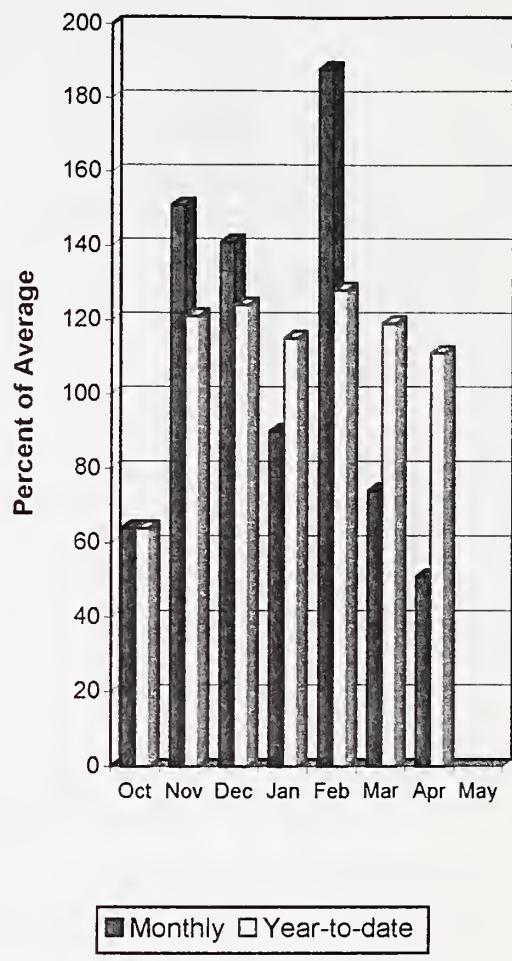
Mountain Snowpack & Precipitation  
Walla Walla River Basin

# Lower Snake River Basin

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

The May - September forecast is for 119% of average streamflow in the Snake River below Lower Granite Dam; the Clearwater River at Spalding, 122%; and 127% of average for the Grande Ronde at Troy. April precipitation was 51% of average, bringing the year-to-date precipitation to 111% of average. May 1 snowpack was at 136% of average. April streamflow was 93% of average for the Clearwater River; 116% for the Snake River below Lower Granite Dam; and 119% for the Grande Ronde River near Troy. Average temperatures were 3 degrees below normal for the area.

# Lower Snake River Basin

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	<===== Drier ===== Future Conditions ===== Wetter =====>						30-Yr Avg.	
		Chance Of Exceeding *		50% (Most Probable)		30%			
		90%	70%	(1000AF)	(1000AF)	(1000AF)	(1000AF)		
GRANDE RONDE at Troy (1)	MAY-JUL	866	1034	1110	127	1186	1354	872	
	MAY-SEP	958	1145	1230	127	1315	1502	970	
CLEARWATER at Spalding (1,2)	MAY-JUL	6042	6921	7320	123	7719	8598	5972	
	MAY-SEP	6457	7401	7830	122	8259	9203	6405	
SNAKE blw Lower Granite Dam (1,2)	MAY-JUL	16810	19072	20100	119	21128	23390	16940	
	MAY-SEP	19595	22212	23400	119	24588	27205	19650	

LOWER SNAKE RIVER BASIN | LOWER SNAKE RIVER BASIN  
Reservoir Storage (1000 AF) - End of April | Watershed Snowpack Analysis - May 1, 1999

Reservoir	Capacity	Usable			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
					LOWER SNAKE, GRANDE RONDE	12	154	136

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

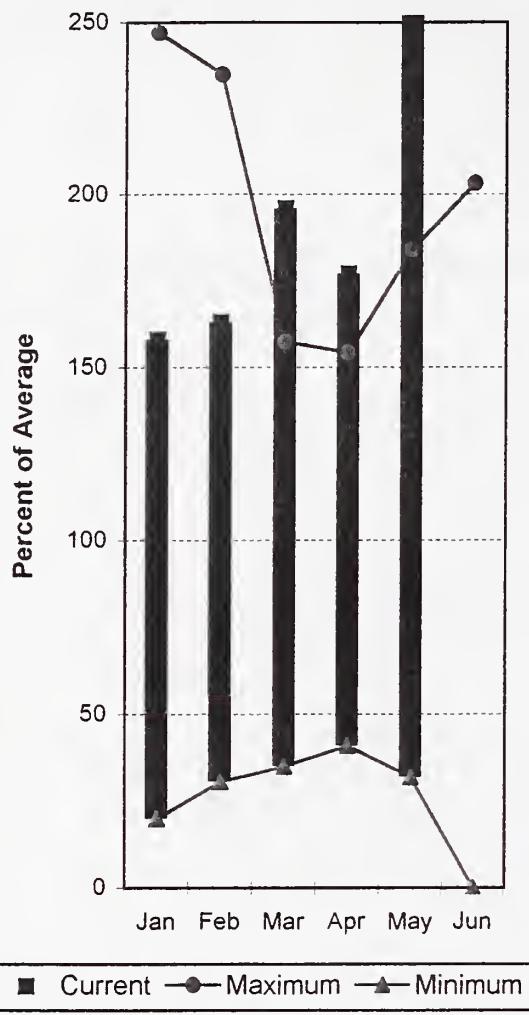
The average is computed for the 1961-1990 base period.

(1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.

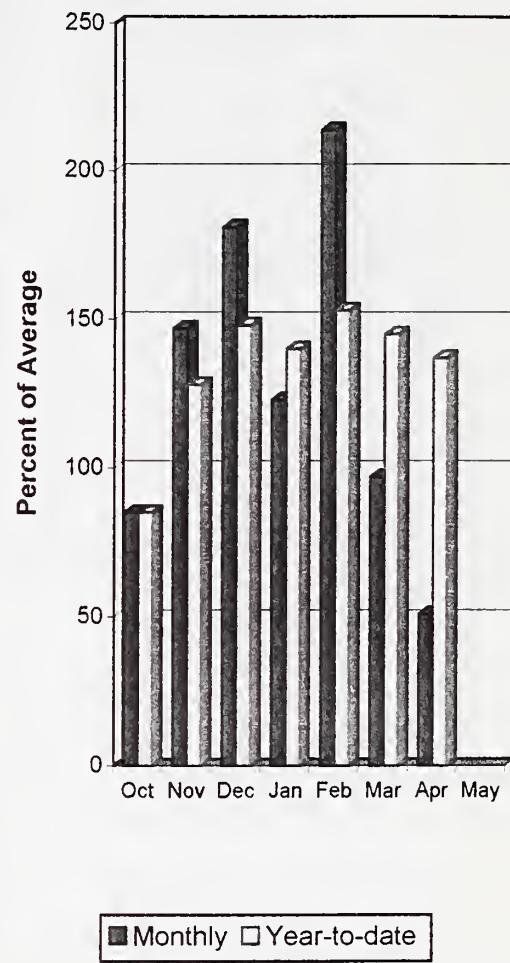
(2) - The value is natural flow - actual flow may be affected by upstream water management.

# Cowlitz - Lewis River Basins

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

The forecast for summer runoff in the Lewis River Basin is 153% of average. The forecast for the Cowlitz River at Castle Rock is for 138%, and the Klickitat River near Glenwood is 179% of average runoff. April streamflow for the Cowlitz River was 76% of average and 81% for the Lewis River. April precipitation was 51% of average, but 137% of average for the water-year. May 1 snow cover for the Cowlitz River Basin was 191%, and the Lewis River Basin was 315% of average. Average snowpack for the combined Cowlitz - Lewis river basins was 253% of average, exceeding the previous maximum by 69%. Paradise Park SNOTEL recorded the most water content for the basin with 107.9 inches of water. Average May 1 water content at Paradise Park is 61.8 inches. Temperatures were slightly below normal during April.

# Cowlitz - Lewis River Basins

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg.	
		<<===== Drier =====>>		Chance Of Exceeding *		Wetter =====>>			
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)		
LEWIS at Ariel (2)	MAY-JUL	966	1040	1090	156	1140	1214	697	
	MAY-SEP	1173	1249	1300	153	1351	1427	850	
	MAY-JUN	792	859	905	156	951	1018	579	
COWLITZ R. bl Mayfield Dam (2)	MAY-SEP	1350	1814	2130	139	2446	2910	1531	
	MAY-JUL	1144	1534	1800	139	2066	2456	1292	
	MAY-JUN	914	1230	1445	139	1660	1976	1038	
COWLITZ R. at Castle Rock (2)	MAY-SEP	1793	2387	2790	138	3193	3787	2021	
	MAY-JUL	1490	1984	2320	138	2656	3150	1679	
	MAY-JUN	1190	1589	1860	138	2131	2530	1349	
KLICKITAT near Glenwood	MAY-JUN	141	149	155	178	161	170	87	
	MAY-SEP	190	201	209	179	217	228	117	
COLUMBIA R. at The Dalles (2)	MAY-SEP	88545	95365	100000	117	104635	111455	85635	
	MAY-JUL	73644	79334	83200	117	87066	92756	71413	
	MAY-JUN	57591	62002	65000	117	67998	72409	55578	

COWLITZ - LEWIS RIVER BASINS  
Reservoir Storage (1000 AF) - End of April | COWLITZ - LEWIS RIVER BASINS  
Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of Last Yr	Average
		This Year	Last Year	Avg				
					LEWIS RIVER	4	245	315
					COWLITZ RIVER	6	184	191

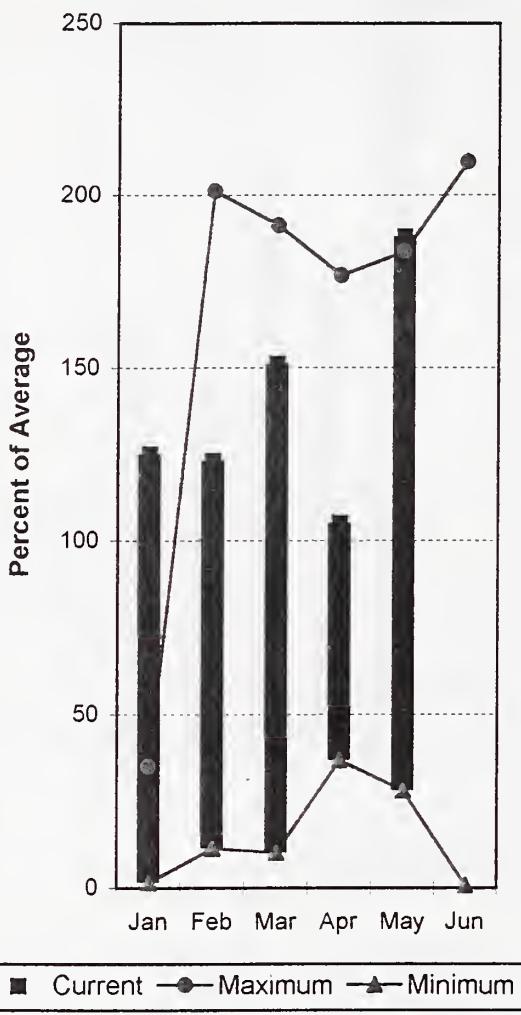
, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

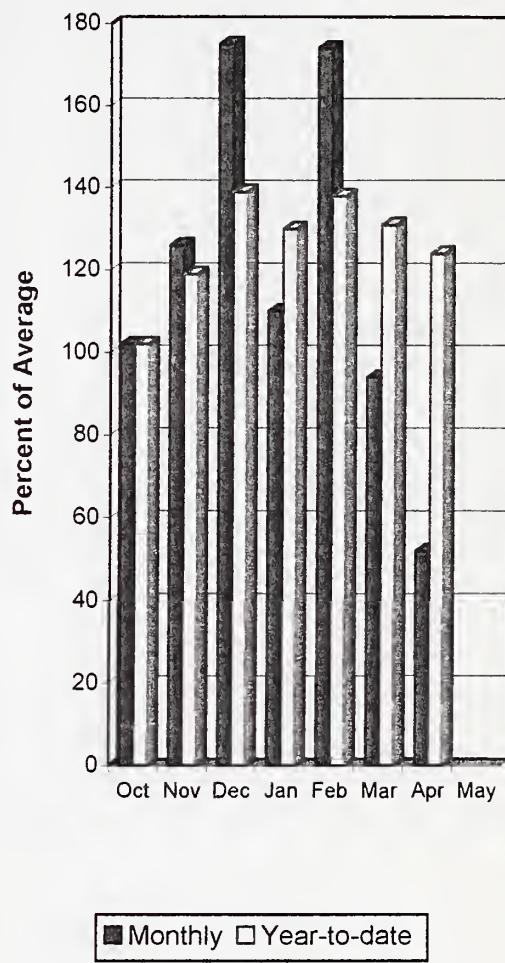
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural flow - actual flow may be affected by upstream water management.

# White - Green River Basins

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

Summer runoff is forecast to be 114% of average for the Green River and 116% of average for the White River near Buckley. May 1 snowpack was 195% of average in the White and Puyallup river basins; and 175% in the Green River Basin. Water content on May 1 at the Corral Pass SNOTEL, at an elevation of 6,000 feet, was 53.7 inches. This site has a May 1 average of 29.5 inches. April precipitation was 52% of average, bringing the water-year-to-date to 124% of average for the basins. Average temperatures in the area were 1 degree below normal.

# White - Green - Puyallup River Basins

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg.	
		<===== Drier =====		Chance Of Exceeding *		Wetter =====>			
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)		
WHITE near Buckley (1,2)	MAY-JUL	260	314	339	96	364	418	354	
	MAY-SEP	434	493	520	116	547	606	449	
GREEN below Howard Hanson (1,2)	MAY-JUL	157	181	192	113	203	227	170	
	MAY-SEP	182	212	225	114	238	268	198	
	MAY-JUN	138	157	166	113	175	194	147	

WHITE - GREEN - PUYALLUP RIVER BASINS  
Reservoir Storage (1000 AF) - End of April | WHITE - GREEN - PUYALLUP RIVER BASINS  
Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
					WHITE RIVER	2	139	195
					GREEN RIVER	2	246	175
					PUYALLUP RIVER	2	139	195

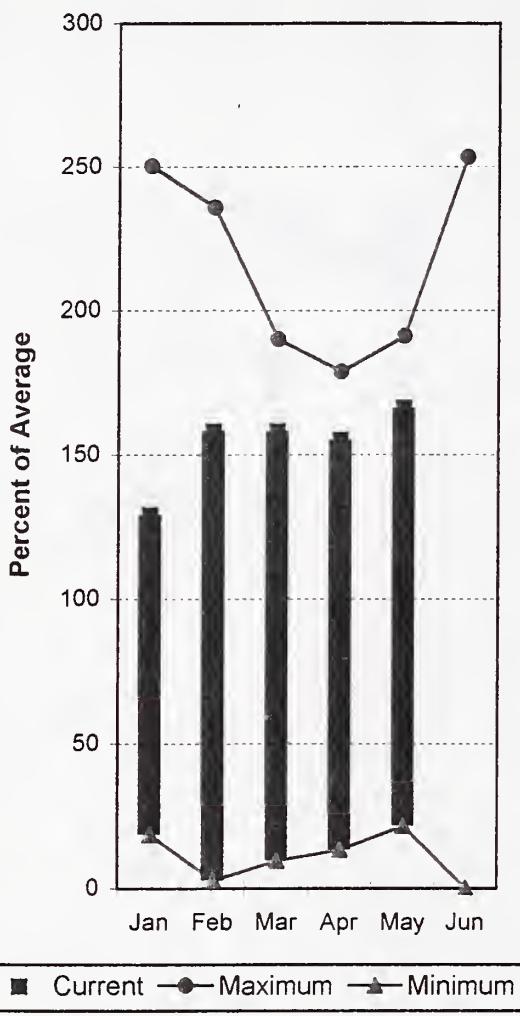
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

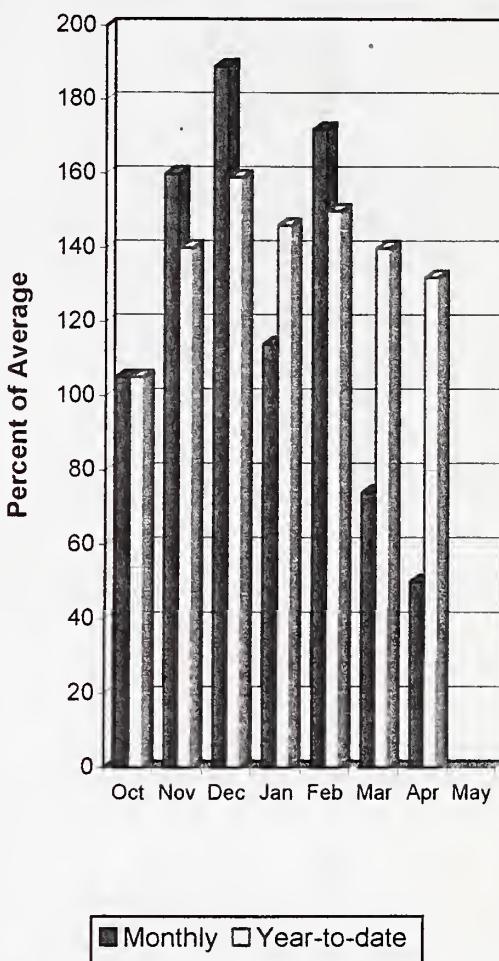
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural flow - actual flow may be affected by upstream water management.

# Central Puget Sound River Basins

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

Forecast for spring and summer flows are 134% for the Cedar River near Cedar Falls; 135% for the Rex River; 128% for the South Fork of the Tolt River; and 132% for the Cedar River at Cedar Falls. Basin-wide precipitation for April was 50% of average, bringing water-year-to-date to 132% of average. May 1 snow cover in the Cedar River Basin was 167%; the Tolt River Basin was 170%; the Snoqualmie River Basin was 169%; and the Skykomish River Basin was 160% of average. Stevens Pass SNOTEL, at 4,070 feet, had 52.5 inches of water content. Average May 1 water content is 28.7 inches. April temperatures were slightly below normal.

*For more information contact your local Natural Resources Conservation Service office.*

# Central Puget Sound River Basins

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Drier				Future Conditions			Wetter		
		90%		70%		50% (Most Probable)		30%		30-Yr Avg.	
		(1000AF)	(1000AF)	(1000AF)	(# AVG.)	(1000AF)	(1000AF)	(1000AF)	(1000AF)	(1000AF)	
CEDAR near Cedar Falls	MAY-JUL	64	71	76	135	80	87	56			
	MAY-SEP	72	80	86	134	91	99	64			
	MAY-JUN	54	60	63	134	67	73	47			
REX near Cedar Falls	MAY-JUL	20	24	26	135	28	31	19.2			
	MAY-SEP	24	28	30	135	33	36	22			
	MAY-JUN	17.9	21	22	135	24	27	16.5			
CEDAR RIVER at Cedar Falls	MAY-JUL	40	59	71	132	84	102	54			
	MAY-SEP	37	58	73	132	87	109	55			
	MAY-JUN	46	59	69	132	78	91	52			
SOUTH FORK TOLT near Index	MAY-JUL	12.1	13.6	14.6	128	15.6	17.1	11.4			
	MAY-SEP	14.6	16.5	17.8	128	19.1	21	13.9			
	MAY-JUN	9.87	11.08	11.90	128	12.72	13.93	9.30			

CENTRAL PUGET SOUND RIVER BASINS  
Reservoir Storage (1000 AF) - End of April

CENTRAL PUGET SOUND RIVER BASINS  
Watershed Snowpack Analysis - May 1, 1999

Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
					CEDAR RIVER	4	350	167
					TOLT RIVER	1	597	170
					SNOQUALMIE RIVER	4	232	169
					SKYKOMISH RIVER	2	247	160

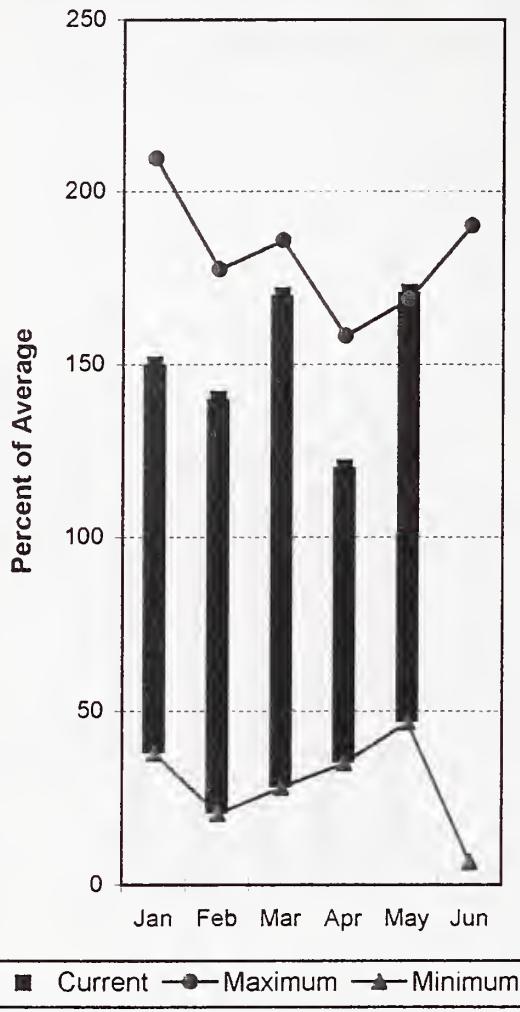
\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

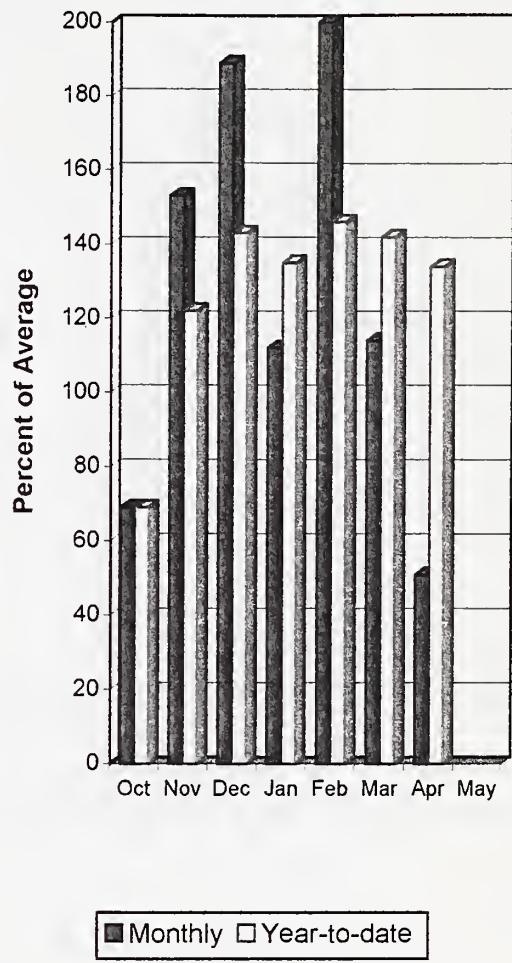
- (1) - The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.
- (2) - The value is natural flow - actual flow may be affected by upstream water management.

# North Puget Sound River Basins

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

Forecast for the Skagit River streamflow is for 132% of average for the spring and summer period. April streamflow in the Skagit River was 155% of average. Other forecast points included the Baker River at 145%, and Thunder Creek at 120% of average. North Puget Sound River Basin precipitation for April was 51% of average, bringing water-year-to-date to 134% of average. May 1 snow cover in the Skagit River Basin was 180%, the Baker River Basin was 151%, and the Nooksack River Basin was 181% of average. Rainy Pass SNOTEL, at 4,780 feet, had 58.7 inches of water content. Average May 1 water content is 36.8 inches. May 1 Skagit River reservoir storage was 62% average and 28% of capacity. Average April temperatures were 1 degree below normal for the North Puget Sound basin. Highway 20 over Washington Pass was opened to through traffic on May 5<sup>th</sup>. Washington Department of Transportation employees worked for weeks, using bulldozers and snow blowers, to clear the highway of up to 85 feet of snow.

*For more information contact your local Natural Resources Conservation Service office.*

# North Puget Sound River Basins

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg.	
		<===== Drier =====		Chance Of Exceeding *		Wetter =====>			
		90% (1000AF)	70% (1000AF)	50% (Most Probable) (1000AF)	(% AVG.)	30% (1000AF)	10% (1000AF)		
THUNDER CREEK near Newhalem	MAY-JUL	227	242	253	121	264	279	209	
	MAY-SEP	344	360	370	120	380	396	308	
	MAY-JUN	126	144	156	121	168	186	129	
SKAGIT at Newhalem (2)	MAY-JUL	2095	2181	2240	136	2299	2385	1649	
	MAY-SEP	2423	2517	2580	132	2643	2737	1961	
	MAY-JUN	1504	1600	1665	136	1730	1826	1224	
BAKER RIVER near Concrete	MAY-JUL	945	996	1030	147	1064	1115	703	
	MAY-SEP	1224	1299	1351	145	1403	1478	930	
	MAY-JUN	619	667	700	146	733	781	478	

NORTH PUGET SOUND RIVER BASINS Reservoir Storage (1000 AF) - End of April	NORTH PUGET SOUND RIVER BASINS Watershed Snowpack Analysis - May 1, 1999
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Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
ROSS	1404.1	599.3	719.5	644.4	SKAGIT RIVER	12	230	180
DIABLO RESERVOIR		NO REPORT			BAKER RIVER	3	157	151
GORGE RESERVOIR		NO REPORT			NOOKSACK RIVER	2	324	181

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

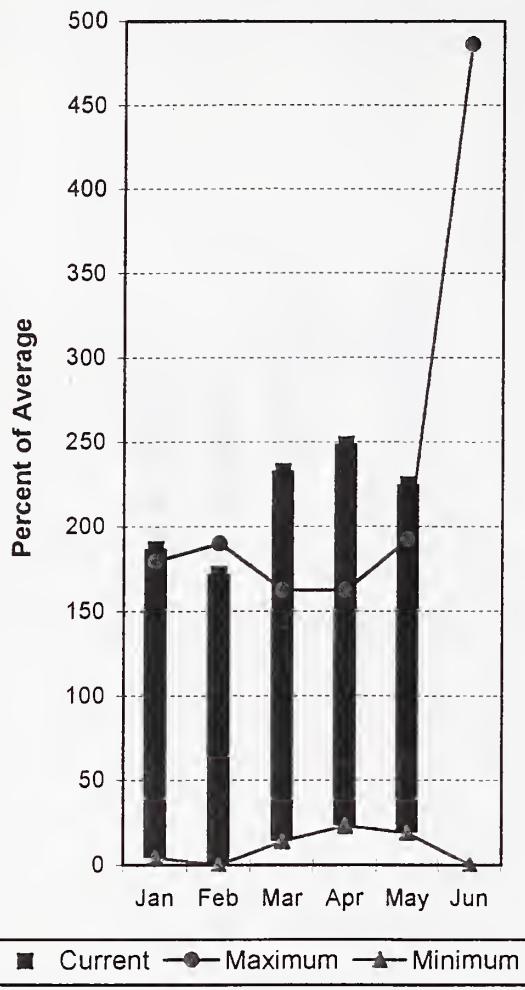
The average is computed for the 1961-1990 base period.

(\*) The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.

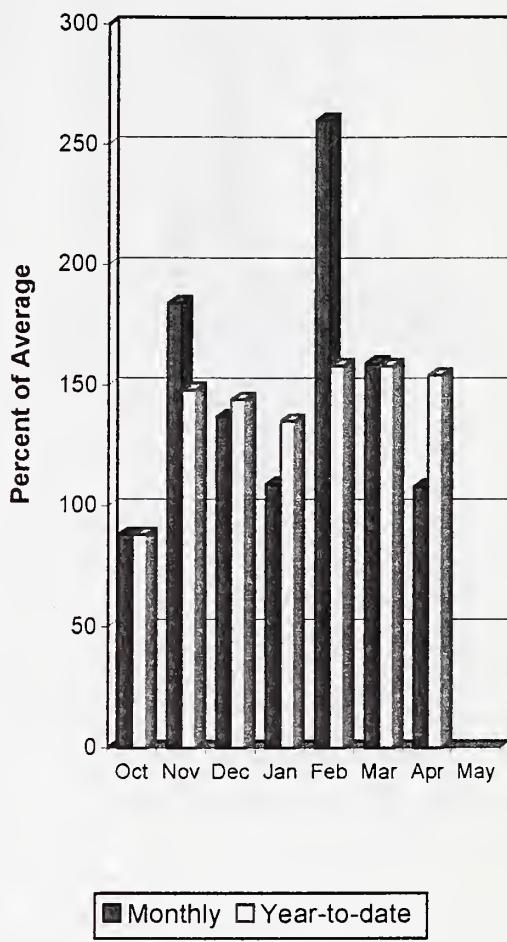
(\*) The value is natural flow - actual flow may be affected by upstream water management.

# Olympic Peninsula River Basins

## Mountain Snowpack\*



## Basin Precipitation\*



\*Based on selected stations

May forecasts for summer runoff for streamflow in the Dungeness River Basin are 152% of average and 161% of average for the Elwha River. The Big Quilcene and Wynoochee rivers can expect much above average runoff this summer also. April precipitation was 58.5% of average. Precipitation has accumulated at 154% of average for the water-year. April precipitation at Quillayute was 3.91 inches. The thirty-year average for April is 7.15 inches. May 1 snow cover in the Olympic Basin was a record breaking 225% of average. The Hurricane snow course was measured to have 53.6 inches of water content and 112 inches of snow depth. Average May 1 water content at Hurricane is only 21.9 inches. Temperatures were 2-3 degrees below average for the month.

# Olympic Peninsula River Basins

## Streamflow Forecasts - May 1, 1999

Forecast Point	Forecast Period	Future Conditions						30-Yr Avg.	
		<<===== Drier =====		Chance Of Exceeding *		Wetter =====>>			
		90%	70%	50% (Most Probable)	30%	10%	(1000AF)		
DUNGENESS near Sequim	MAY-SEP	190	198	204	152	210	218	134	
	MAY-JUL	154	160	164	153	168	174	107	
	MAY-JUN	103	110	115	152	120	127	76	
ELWHA near Port Angeles	MAY-SEP	653	680	698	161	716	743	434	
	MAY-JUL	526	548	562	162	576	598	348	

## OLYMPIC PENINSULA RIVER BASINS

Reservoir Storage (1000 AF) - End of April

## OLYMPIC PENINSULA RIVER BASINS

Watershed Snowpack Analysis - May 1, 1999

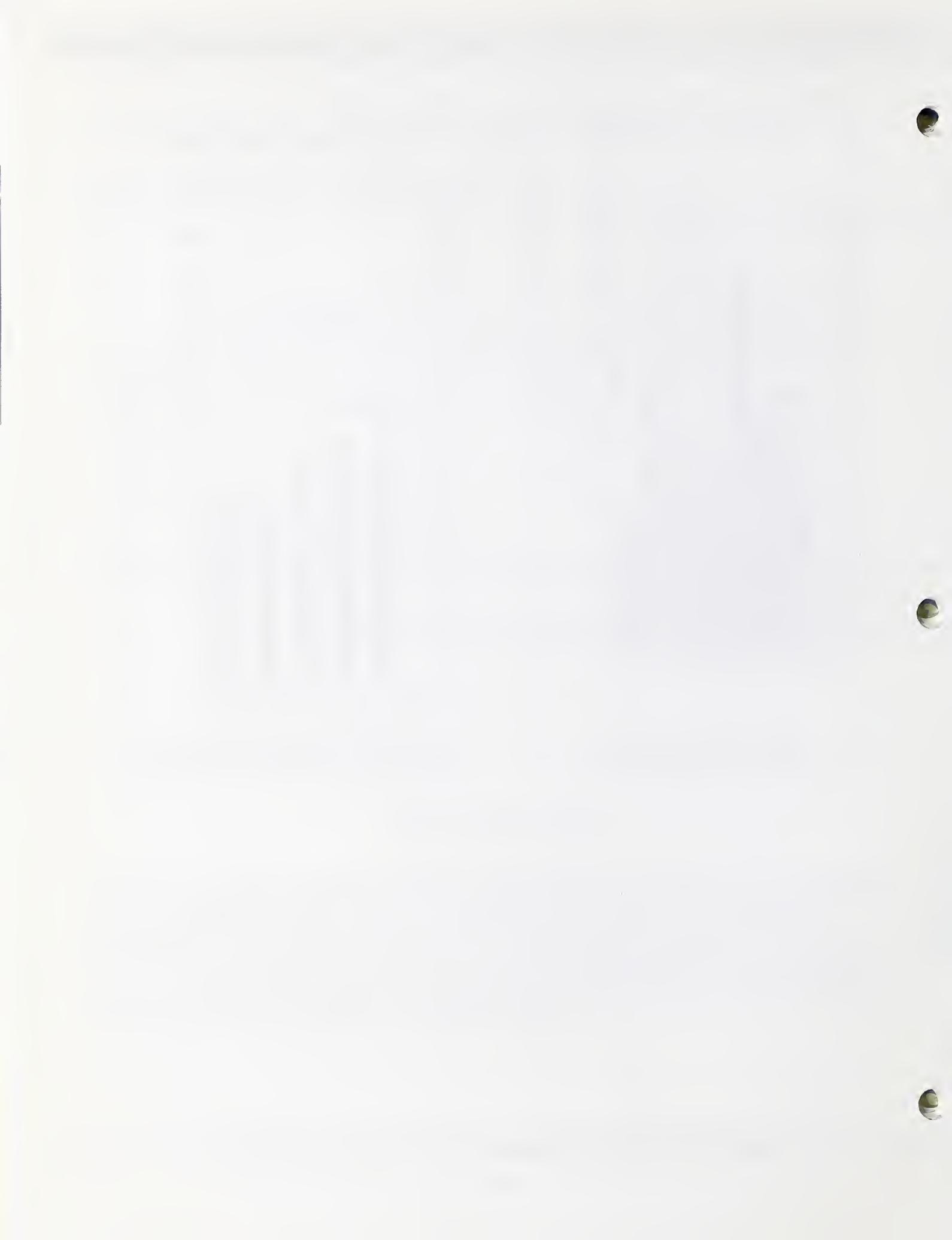
Reservoir	Usable Capacity	*** Usable Storage ***			Watershed	Number of Data Sites	This Year as % of	
		This Year	Last Year	Avg			Last Yr	Average
					OLYMPIC PENINSULA	4	218	225
					ELWHA RIVER	1	353	245
					MORSE CREEK	1	196	190
					DUNGENESS RIVER	1	299	280
					QUILCENE RIVER	1	142	223
					WYNOCHEE RIVER	0	0	0

\* 90%, 70%, 30%, and 10% chances of exceeding are the probabilities that the actual flow will exceed the volumes in the table.

The average is computed for the 1961-1990 base period.

(1) The values listed under the 10% and 90% Chance of Exceeding are actually 5% and 95% exceedance levels.

(2) - The value is natural flow - actual flow may be affected by upstream water management.



Issued by

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The Following Organizations Cooperate with the Natural Resources Conservation Service in Snow Survey Work\*:

Canada	Ministry of the Environment Investigations Branch, Victoria, British Columbia
State	Washington State Department of Ecology Washington State Department of Natural Resources
Federal	Department of the Army Corps of Engineers U.S. Department of Agriculture Forest Service U.S. Department of Commerce NOAA, National Weather Service U.S. Department of Interior Bonneville Power Administration Bureau of Reclamation Geological Survey National Park Service Bureau of Indian Affairs
Local	City of Tacoma City of Seattle Chelan County P.U.D. Pacific Power and Light Company Puget Sound Power and Light Company Washington Water Power Company Snohomish County P.U.D. Colville Confederated Tribes Spokane County Yakama Indian Nation Whatcom County Pierce County
Private	Okanogan Irrigation District Wenatchee Heights Irrigation District Newman Lake Homeowners Association Whitestone Reclamation District

*\*Other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.*



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